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Practice, skills and experience with the Pinard stethoscope for intrapartum Foetal monitoring: Focus group interviews with Norwegian midwives.

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ABSTRACT

Objective: In most high-income countries, the cardiotocography and handheld Doppler device have replaced the Pinard stethoscope for intrapartum foetal monitoring. As a result, the skills required to use the Pinard are rapidly disappearing from midwifery. The aim of this study was thus to illuminate the knowledge before it is lost, by exploring the practice, skills and experience of Norwegian midwives familiar with the Pinard for intrapartum foetal monitoring. We included midwives who still regularly use the Pinard in their current practice in a variety of birth settings, and those who used the Pinard in the era prior to the introduction of the CTG.

Design: This study followed a qualitative descriptive design based on mainly focus group interviews, but also including one individual interview. The interviews explored the participants' perspective on their practice, skills and experience regarding the use of the Pinard for intrapartum foetal monitoring. Reflexive thematic analysis captured common patterns across the data, and contextualism was used as research paradigm.

Setting and participants: In total, 21 midwives with experience using the Pinard for intrapartum foetal monitoring were interviewed. The midwives were either retired and had experience using the Pinard from before the CTG became widespread; worked in an alongside midwifery unit that only oversees low-risk births; or worked in an obstetric unit in a university hospital with an active policy of using the Pinard for intrapartum foetal monitoring.

Findings: The analysis resulted in four main themes: "Practice and experience with the Pinard are related to context", "Skills with the Pinard come with work experience", "The Pinard reveals certain characteristics of foetal sound" and "Midwives' experience with the benefits of using the Pinard". The midwives considered the context for using the Pinard for intrapartum foetal monitoring relevant. The availability of technology and applicable situations for using the Pinard influenced how and when they use the Pinard. They further underpinned training and work experience as important for feeling secure when using the Pinard, and this experience made them recognize normal and abnormal foetal sounds. Defining and characterizing these sounds appeared difficult for the midwives, however, and they hesitated and imitated the sound. The midwives felt that the Pinard is beneficial for both the labouring woman and the midwife, as the Pinard's features bring them closer to the labouring woman and help calm the birth suite. They also felt that the Pinard adds further information about the birth and birth process, such as foetal lie, rotation and descent.

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Keyconclusions: Norwegian midwives' practice, and experiences in using the Pinard for intrapartum foetal monitoring are connected to context as technological development and applicable situations. The midwives explained that knowledge obtained through experience gives them skills to differentiate between normal and abnormal foetal sound characteristics, though they found it difficult to define the characteristics themselves. Using the Pinard stethoscope during birth calms the birth suite and brings the midwife closer to the labouring woman.

Introduction

Intrapartum foetal monitoring assesses foetal wellbeing. It helps identify foetuses at risk of neonatal and long-term injury in a timely manner, thereby enabling interventions to prevent foetal damage (Lewis et al., 2015). There are two main approaches to intrapartum foetal monitoring: intermittent auscultation (IA) and continuous monitoring via cardiotocography (CTG) (Alfirevic et al., 2017). In some settings, intermittent CTG occurs in combination with IA (Ayres-de-Campos et al., 2015). Continuous CTG monitoring is associated with a decreased risk of neonatal seizures in prolonged and/or oxytocin augmented labours, no difference in cerebral palsy or neonatal mortality and with increased risk for caesarean section and operative vaginal deliveries (Grant, 1989, Alfirevic et al., 2017). The body of knowledge is considered to be moderate to low quality (Alfirevic et al., 2017). Both national and international guidelines, recommend IA for foetal monitoring for labouring women at low risk for complications, and CTG for labouring women at high risk for complications (National Institute for Health and Care Excellence (NICE); Yli et al., 2014; 2014; Ayres-de-Campos et al., 2015; International Confederation of Midwives (ICM), 2017; World Health Organization (WHO), 2018).

IA is the technique of periodically (every 15–30 min) listening to and assessing foetal heartbeat in conjunction with uterine contractions, throughout active labour. IA is usually performed using a Pinard stethoscope or hand-held Doppler device. The Pinard stethoscope is a hollow tube made of wood, metal or plastic that falls between 15 and 60 cm long. With this instrument, the medical professional can, in real time, hear the sounds associated with the opening and closing of the foetal heart valves during each cardiac cycle. A hand-held Doppler device is a small ultrasound transducer that provides an audible simulation of the foetal heartbeat (Lewis et al., 2015).

Until about 40 years ago, before the introduction of CTG, both obstetricians and midwives used the Pinard for foetal monitoring in all births (Banta and Thacker, 2002). In high-income countries, CTG became widespread after its introduction and today, continuous monitoring dominates foetal surveillance, even in low-risk births (Maude et al., 2016; Norwegian Institute of Public Health (NIPH), 2018; Rosset et al., 2020). As CTG has become dominant in the birth suite, IA occurrence reduced, with a subsequent loss of related skills and experience. Hence, the skills necessary to use especially the Pinard are rapidly disappearing from midwifery practice in high-income settings (Maude et al., 2016; NIPH, 2018).

The purpose of this study was thus to explore the practice, skills and experiences of midwives familiar with the Pinard for intrapartum foetal monitoring. There is limited research within this field of foetal monitoring, and we wanted to preserve this knowledge before it is lost. We therefore interviewed midwives who regularly use the Pinard in their current practice in a variety of birth settings, and those who used the Pinard before the introduction of CTG.

Methods

We followed a qualitative approach to explore the participants' perspectives on their practice, skills and experience with the Pinard as an instrument for intrapartum foetal monitoring. In qualitative research the participants' and researchers' perspectives and subjectivity cannot be eliminated, and instead need to be taken into account (Braun and Clarke, 2013). Related, this study's research paradigm was contextualism, "which assumes that meaning is related to the context in which it was produced" (Braun and Clarke, 2013, p. 328). Contextualism does not assume one single reality, but recognizes that knowledge emerge from context, is true in that context and reflects the researcher's position (Braun and Clarke, 2013). Accordingly, our position and theoretical assumptions as researchers defend that birth is a physiological process. The task of the midwife is to promote normal processes, strengthen women's capabilities and intervene only when indicated

The Norwegian setting for maternity care is described in Fig. 1 and in Supplementary file 1.

Participants

We performed four focus group interviews and one individual interview. The focus groups took place at meeting rooms in two different hospitals and at one university college. The individual interview was performed in a private setting, to accommodate the participant's physical health. Each of the focus groups consisted of 4–6 participants, totalling 20 midwives. The focus group interviews were performed from February to March 2020, with each lasting 60–80 min. The individual interview was performed in June 2020 and lasted 45 min.

The participants were recruited by research midwives, heads of birth units and members of the research group. To collect significant data, we designed the recruitment with the intent to involve sufficient midwives who were experienced in using the Pinard. We included midwives from the following settings: 1) an alongside midwifery-led unit aiding low-risk births only and where IA was the only method for foetal monitoring (one focus group), 2) an obstetric unit in a university hospital that has an active policy of promoting Pinard use and the highest proportion of labouring women monitored with a Pinard in Norway at 27% (NIPH, 2018) (two focus groups), and 3) retired midwives with clinical Pinard experience from before the widespread of CTG and Doppler (one focus group and one individual interview). Midwives without clinical experience in using the Pinard for intrapartum foetal monitoring were excluded.

Data collection

In total, 21 midwives were included in the study. CHE moderated the focus groups, together with EB. ABVN was present in three of the focus groups. AK performed the individual interview, with CHE observing.

Table 1
Interview guide.

1. Can you describe what you listen for when you use the Pinard? Describe a normal sound. Describe an abnormal sound.
2. Can you recount an episode where you used a Pinard and heard an abnormal sound? What did you hear? What did you do next?
3. What differences are there between listening via a Pinard versus a Doppler? What can you hear with a Doppler that you cannot hear with a Pinard and vice versa?
4. In which situations do you choose a Pinard and in which do you choose a Doppler? Are there any situations during a normal birth that you think are not appropriate to use a Pinard? Are there some occasions you think it is appropriate to use a Pinard?
5. Is there something else you want to add?
To the retired midwives
6. Can you say something about your experience using the Pinard, from the beginning of your practice in the maternity ward?
7. How did you describe foetal heart sound before CTG was introduced?

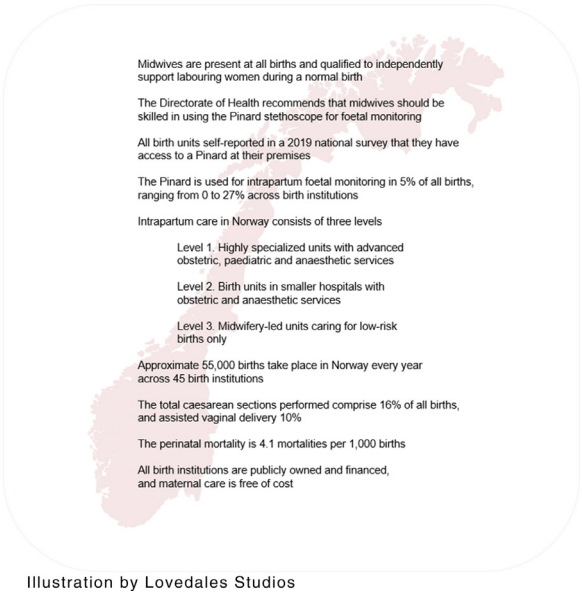

Fig. 1. Norwegian setting for maternity care.

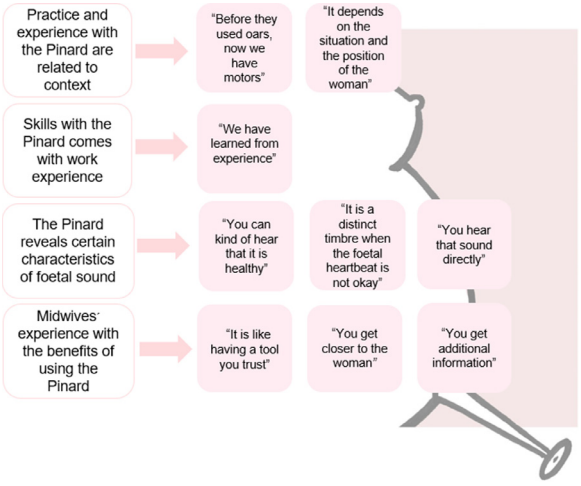

Fig. 2. Illustration of study themes and subthemes.

This means of collecting data made the participants interactively influence and be influenced by each other. As researchers, we encouraged the participants to discuss and reflect on their experiences (Kitzinger and Barbour, 1999; Kvale et al., 2015). The interview guide was semi-structured and facilitated open-ended questions, as shown in Table 1. It consisted of four main questions and two additional questions for the retired midwives. The additional questions were presented the retired midwives only, because of their experience from before CTG and Doppler devices became widespread. As moderators, we asked follow-up questions or sought clarification if an answer was unclear. The interviews were audio-recorded with a Dictaphone application, encrypted and sent to a safe storage (Nettskjema, University of Oslo, 2021).

Data analysis

We transcribed the interviews verbatim in Norwegian and entered them in NVivo (QSR International Pty Ltd. Version 12, 2018). CHE, EB, ABVK and AK were involved in the data analysis, which took the form of reflexive thematic analysis, to capture common patterns across the data clustered around the central concept: Pinard use for intrapartum foetal monitoring. The analysis consisted of six reflexive phases further explained in Table. 2 (Braun and Clarke, 2013; Braun et al., 2018).

Ethics

The participants received written information about the study and signed a consent form before their inclusion. They were kept anonymous throughout the analytic process, and only the participants in the same focus groups could identify each other. This study was approved by the Regional Ethical Committee (2019/99/REK sør-øst A), the Data Protection Officer at Oslo University Hospital (SD1057369) and the Norwegian Centre for Research Data (153,660).

Findings

All of the participants except one had contemporary or previous experience in obstetric units, while some of the retired midwives and some of those working in obstetric units did not have experience in low-risk settings. The groups were mixed with participants with different experience using the Pinard for foetal monitoring during birth. Characteristics of the participants and focus groups are described in Table. 3. We experienced that our research questions were well and adequately answered throughout the interviews.

The analysis resulted in four main themes and nine subthemes, as presented in Fig. 2. The main themes are Practice and experience with the Pinard are related to context, Skills with the Pinard come with work experience, The Pinard reveals certain characteristics of foetal sound and Midwives' experience with the benefits of using the Pinard. The nine subthemes are named according to participant quotes.

Practice and experience with the Pinard are related to context

"Before they used oars, now we have motors"

The retired midwives started working at a time when they did not have a choice of instrument for intrapartum foetal monitoring. They only had the Pinard: "When I went to midwifery school, it was nothing else, […]" (participant 13). These midwives reflected

Table 2
Descriptions of reflexive thematic analysis according to Braun and Clarke (2013, 2018).

Analytic phases	Descriptions of the phases in the current study
1. Familiarizing with the data	A phase featuring data immersing. We became familiar with the data during the interviews. The first author transcribed the interviews, then read and re-read the transcriptions, allowing familiarization with the data. The remaining co-authors became familiar with the data by reading the verbatim transcribed interviews. We wrote analytic notes after each interview
2. Generating codes	A phase involving a systematic and detailed process of coding all data that might relate to the research question and capture a single idea. The coding was inductive, with no pre-existing theoretical framework. We linked codes and quotes per similar content and gathered them in groups (collated the coded data). Each co-author received one interview to read in-depth and discussed the codes for that interview with the first author.
3. Constructing themes	A phase continuing the active process from phase two and the first step of theme constructing. It involved examining and collating similar codes to look for broader patterns of meaning and create candidate themes. We gathered data relevant to each theme together. Our resulting constructed themes reflected what was relevant, not necessary what came up the most. All authors discussed the relevance to the research question.
4. Reviewing themes and revising candidate themes	A phase involving a review of the candidate themes to determine if they tell a convincing story related to the dataset and research question. We critically reviewed the themes and refined them, to make sure that they captured the essence and spread of meaning. The first author re-listened the interviews, and re-read the transcription and analytic notes, to make sure the themes were still relevant to the research question.
5. Defining and naming themes	A phase ensuring that the themes and their names were clear and captured the meaningfulness of the data, in relation to the research question. This phase involved developing a detailed analysis of each theme, and determining the story of each, providing a rich, coherent, and meaningful picture of the data. We created definitions to define the focus and boundaries, which the first and last author then discussed. We applied names to each theme to capture their core.
6. Producing the report	The last phase of analysis, involving the writing of an analytic narrative to connect the results and discuss them in relation to existing research. The co-authors held a discussion, regarding the description of the themes in the article. We then made further theme revisions, concerning content, structure, and names.
Subjectivity and reflexivity	Researchers and participants bring their subjectivity into research, with their own stories, values and assumptions. We counterbalanced this by being reflexive, in the sense of critically reflect on our role in our research and the knowledge we produce. We held semi-structured interview in which the participants were encouraged to freely tell their story, with little interruptions. We have different clinical experience as well; from different levels of maternity wards, from before the widespread of CTG and Doppler devices, and from contemporary maternal care, offering diverse views of the Pinard for foetal monitoring.

Table 3
Characteristic of the midwives in the focus groups and individual interview.

Focus group (FG)/Individual interview	Participant numbers (1–21)	Age (range)	Years of midwifery experience (range)	Experience per level of intrapartum care (N)*		
				Level 1	Level 2	Level 3
FG 1	1- 6	49–63	8–37	6	5	6
FG 2	7–10	34–61	2.5–34	3	1	1
FG 3	11–16	64–77	30–43	6	5	5
FG 4	17–20	42–66	15–38	3	3	3
Individual	21	>80	40	1	0	0
Midwifery experience (years)	N					
< 5	1					
5-10	1					
11-20	3					
21-30	3					
> 30	13					

* Descriptions of intrapartum level of care (see Fig. 1).

on the change in modes of foetal monitoring throughout their time in midwifery practice. At first, they were sceptical of technological developments, as seen with participant 12, “I remember when the first CTG machines came, we did not want to use them, we threw them out in the hallway, along with the new technical beds”. After some time, using the new technology became a habit and the midwives came to appreciate technological developments like the Doppler device and CTG.

Technological development was a topic in all the interviews, and several midwives questioned if they appeared old-fashioned as they wanted to hold on to the Pinard.The midwives talked considerably about the world moving forward, and that it is easier to choose technology. A couple of the retired midwives even implied that the Pinard was outdated and should be replaced by a Doppler device. One stated, “Before they used oars, now we have motors” (participant 16), meaning that today there are alternative methods for intrapartum foetal monitoring.

Most of the midwives said that the Pinard provides different information than the Doppler, and that it is important to keep it in use. They shared the opinion that something disappears along the way with electronic technology. In particular, they were concerned that certain midwifery knowledge and practice would be lost, such as the midwife’s proximity to the labouring woman, promoting the normal birth process and the craft of midwifery itself. They closely linked the Pinard to midwifery practice: “[Not using the Pinard] is a shame, and I think that we lose some of the midwifery knowledge we have taken along all this time, that it is dying, and then we undermine our own discipline […]” (participant 4).

“It depends on the situation and the position of the woman”

All the midwives agreed that the Pinard is used in specific situations only. They regarded the first assessment of the foetus as suitable for the Pinard. Participant 19 said: “I always use it upon admission […] ”, and many of the midwives did a thorough assessment with the Pinard the first time they listened to the foe-

tus: “To do an assessment the first time I listen to [the foetus], to make sure everything is okay. Here everything is within the normal [range], she [the labouring woman] feels foetal movements, there are accelerations […]” (participant 6).

If women were admitted because of reduced foetal movements, most of the midwives auscultated with the Pinard first. They said that this gives them extra time to build up the strength to pass on a sad message in the case of foetal demise. “Then first to listen with the Pinard, because then you can, you can kind of prepare,” said participant 2, and participant 1 finished with “Prepare for what to do”,

In addition, using a Doppler in these situations could be a source of error if the woman’s heartrate, probably high at this point, was mistaken for the foetal heart. Using the Pinard was considered to add calm to this difficult situation, from the surroundings to the mother and the midwife.

There were several situations in which the midwives found the Doppler a better choice than the Pinard, however. These included interacting with women who were overweight, positions where using the Pinard was difficult, “If the woman is squatting, then I cannot use the Pinard,” participant 2 offered, if the woman could not be still or if she or her partner wanted to hear the foetal heartbeat. The midwives also mentioned the second stage of active labour as a period in which they preferred the Doppler.

Due to practical challenges when using the Pinard, only a couple of the 21 midwives said that they would use the Pinard as the only instrument for foetal monitoring during the entire labour.

Skills with the Pinard come with work experience

“We have learned from experience”

The midwives emphasized that training and experience are important to feel secure when using the Pinard for intrapartum foetal monitoring. They explained that they obtained knowledge through experience, and many conveyed that this occurred over years of training. “You need to use the Pinard to learn, really. Because, you do not learn it right away, you first learn when you have used it for a while”, participant 21 stated. Especially the retired midwives stressed experience and training as important, and that listening with the Pinard must be habitual. The midwives with experience from before the widespread use of CTG and Doppler devises, started using the Pinard from their first practice as students, while the others used it as students and/or trained themselves whit it after graduation. The midwives believed that after using the Pinard for many years, and listening to thousands of sounds, they could recognize normal and abnormal foetal heartrate patterns.

The Pinard reveals certain characteristics of foetal sound

The midwives expressed difficulties when they were asked to describe the foetal heart sound heard through the Pinard. They were hesitant, imitated rather than defined the sound and said that they did not have the right words. They also said that the existing terminology to describe foetal heart sound is related to CTG use, not the Pinard. Despite this, they were very clear that they were able to recognize normal and abnormal foetal heart sounds.

“You can kind of hear that it’s healthy”

The midwives stated that timbre (Norwegian: klang) is an important characteristic of foetal heart sound. Timbre has its origins in music and refers to the character of a sound, as put together by its different qualities Ormestad (2018). A foetal heart sound with a good timbre has a deep, clear and distinct sound. The midwives described normal foetal heartbeats as having a good timbre and an ample, determined and powerful sound. The midwives could hear within the sound itself if the foetus is healthy: “So that sound, it’s not just the bumping, but the sound itself that I think is…you can kind of hear that it’s healthy” (participant 1).

The foetal heartrate also needed to stay within a normal baseline for the midwives to evaluate it as normal. The sound should be regular, but not the same rhythm all the time. They could hear variation when they suddenly needed to count a little faster: “You can hear a change in the pace, and that is a healthy sign for the foetus” (participant 17). Related to a normal foetal sound, many of the midwives mentioned accelerations of the rhythm. They said that if they hear a normal baseline and accelerations, it is enough to determine that the foetus is doing fine.

“It is a distinct timbre when the foetal heartbeat is not okay”

The midwives continued to bring up timbre when characterizing abnormal foetal heart sound. They said that it is a particular timbre when the foetal sound is not good, describing it as “thin”, “split” and “not clean”. Many of the participants spoke of a choppy (Norwegian: hakkete) sound. When asked to elaborate on the word “choppy”, participant 6 said, “Yes, it is a bit difficult to describe, but it is not a clean sound., It is not the regular good sound, but it is something [like the] cutting of an entire timbre, in a way.” The midwives also explained the choppy sound as irregular (Norwegian: uregelmessig), or as if the heart skips beats.

The strength of the foetal sound was important for the midwives as well, with a weak and distant sound considered an important indicator of an abnormal sound. They explained it like hearing the foetus struggle or hesitate. They could hear if the sound is weak or strong much easier with the Pinard than the Doppler: “When you have a Doppler or a CTG, you do not get if it is weak or if it is strong. You do not get the rhythm, or how strong it is, or how weak it is […]” (participant 21).

“You hear that sound directly”

According to the midwives, the Pinard isolates and concentrates the foetal heart sound, and many of them said that the sound is different compared with the Doppler device. Several of the midwives also said the sound with the Pinard was “not synthetic” with a couple comparing it to butterfly wings. The sound of the Pinard was characterized as soft, deep and direct, as opposed to the sound from the Doppler, which was metallic, electronic and sometimes delayed. With the Pinard, the midwives also got closer to the sound by listening directly to the foetal heart with their own ear. As participant 1 said, “You listen directly, you get the sound right into…,” and participant 3 joined in with “your own ear”.

With the Pinard, the midwives explained that they could hear variations in the foetal sound. With the Doppler, they only heard the frequency. Almost all midwives described the sound with the Doppler as equal for every foetus, without any individuality. Participant 5 summed it up like this:

And if you have a, what to call it, a groggy sound, or something, where I only have listened with the Doppler, then I would have been much more insecure about what is happening with the foetus than if I had listened with the Pinard to start with and knew that I actually had heard a deep timbre and that was good, but now I hear something else. Something has happened. That difference I do not pick up with the Doppler, because that sound is always the same.

Midwives‘ experience with the benefits of using the Pinard

“It is like having a tool you trust”

For the midwives using the Pinard for monitoring meant using a tool they trusted, as illustrated by the subtheme name, a quote from participant 13. The midwives linked this trust to the security of listening directly to the foetus that the Pinard gave them, with no electronic instrument that interpreted the heartbeats. Participant 5 illustrated this trust: “ […] because you hear that sound directly, it makes me very safe”. The thorough first assessment they had done with the Pinard, also allowed them to get to know the sound of the individual foetus. This was a feature of the Pinard

that helped them assess for potential changes during birth. “To get to know this timbre, so you can recognise it later, or not recognise it, or if something has changed” as participant 1 put it.

Nevertheless, the most important aspect and foundation of foetal monitoring, was being able to monitor the foetus appropriately, as illustrated in one of the interviews. When asked what was most important regarding foetal monitoring, participant 13 responded, “To know that the foetus is okay, that is most important”. Several of the midwives said they felt the same security regardless of if they used the Pinard or the Doppler and believed that it was important to feel safe independent of the instrument used.

“You get closer to the woman”

The midwives explained that they used many senses when assessing foetal heartbeats. They touched and felt the temperature of the labouring woman’s skin, they smelled, they saw, and they listened. Some of the midwives explained that they used more senses when using the Pinard, and that they considered it to create a higher degree of tactile use. They believed that labouring women need closeness, and that the Pinard more than the Doppler conveys this closeness. Participant 10 explained additional features that the Pinard contributes:

“[…] we convey much more, like your presence, your handgrip, you convey security, and the woman can feel that she is in safe hands or not […]. You convey trust, and a knowledge not everyone has. As a midwife. With this art”.

The midwives also felt that using the Pinard is more peaceful during labour and that the properties of the Pinard better promote a physiological birth. The Doppler can be noisy and make metallic sounds; the Pinard is silent and thus adds calmness. This was considered a positive element, as the midwives believed disturbance can interfere with the normal birth process.

“You get additional information”

The Pinard was used for more than just listening to heartbeats. Used in conjunction with abdominal palpations, the Pinard can help determine the foetus’s position and contribute to the assessment of the baby’s size:

“If you first are going to listen and find out how that foetus is positioned, then it is necessarily to know which way the back is, and when you get more hands on, a more feeling with…yes, both the size and position and whether it is well descended into the pelvis or not, and if it is up and down [..], you get important information when you do that examination (participant 6)”

The midwives also considered the Pinard useful in following the cardinal movements of the foetus and mentioned it as an alternative to vaginal exams. Participant 5 said, “…and then I got such good use for the Pinard, because I could hear the foetus rotate […]. I could hear the sound was good, and I did not examine her (the labouring woman) once during the birth,” showing how she adapted to the wishes of a labouring woman who did not want vaginal examinations.

As the Pinard was used for more than just intrapartum foetal monitoring, the midwives were highly aware that more than the heartrate is important in the assessment of foetal wellbeing.

“You do an overall assessment, right, what do you know from the woman’s pregnancy, what do you know about the amniotic fluid, what do you know about -what disease does the mother have, what disease does the foetus have, what are the foetus‘s resources, an overall assessment all the time in the monitoring during birth" (participant 10).

Discussion

The interviews analysis enabled us to examine midwives’ different perspectives and stimulated the participants to bring forth various points of view. Through reflexive thematic analysis, we explored the midwives’ practice, skills and experiences in using the Pinard stethoscope for IA. We identified four themes: Practice and experience with the Pinard are related to context, Skills with the Pinard come with work experience, The Pinard reveals certain characteristics of foetal sound and Midwives‘ experience with the benefits of using the Pinard.

The midwives expressed their experiences with the contextual use of the Pinard and related this to technological development and specific birth situations. The retired midwives shared that they were sceptical upon the introduction of technological devises, but eventually appreciated the technological developments and felt that their use soon became habitual. Several of the midwives felt that it was easier to choose electronic technology, and they considered it more practical to use the Doppler than the Pinard. They added that they used the Doppler more frequently than the Pinard. Whereas the Pinard can be difficult to use when the labouring woman is in positions like squatting or on all fours, the Doppler can be used independent of the woman's position during birth (Marshall et al., 2014; Lewis et al., 2015). An Irish study exploring midwives’ experience with IA similarly found that the Pinard was regarded as impractical, because the woman had to change position before auscultation, and the parents could not hear the foetal heart sound (Hill, 2016).

In 2018 in Norway, the Doppler was used in 48% of all births and the Pinard in 5% (NIPH, 2018). In 2019 all birth institutions in Norway reported that they had access to Pinard at their premises (Kaasen et al., 2019). Hofmann (2002) argues that technology in healthcare has become a habit, and a part of heuristics, though perhaps used too much too soon.

Even if there were situations when the Doppler was more used than the Pinard, there were situations where most of the midwives preferred the Pinard, like the first assessment and reduced foetal movement. Additionally, most of the interviewed midwives held on to the importance of keeping the instrument in use. They expressed that fundamental midwifery knowledge, such as the midwife’s proximity to the labouring woman, promoting normal birth progress and the midwifery craft itself are threatened by unnecessary technology use. Other studies have also highlighted the impression that midwifery skills are disappearing along with the Pinard (Smith et al., 2012; Aanensen et al., 2018).

The midwives used some descriptions like “timbre” (klang) and “choppy” (hakkete) when asked to describe the sounds heard through the Pinard; these terms are used in an older Norwegian textbook as well (Bjøro and Molne, 1972). The midwives also used some terms not previously known to us (the authors), such as “butterfly wings” and “not synthetic”. Despite these descriptions, the midwives expressed difficulties and hesitated when they were asked to describe and define foetal sound. Of note, it is not a practise in Norway to fully describe the foetal heart sound heard through a Pinard, but rather indicate if it “poor” or “good” (Bjøro and Molne, 1972) Additionally, both earlier and contemporary textbooks used in Norwegian midwifery schools and contemporary international guidelines on intrapartum foetal monitoring have no descriptions of the foetal heart sound apart from the baseline and, in a few exceptions, the rhythm (Bjøro and Molne, 1972; Henderson and MacDonald, 2004; Blix et al., 2017, Blix et al., 2019). This can explain why the midwives repeatedly expressed that they did not have the exact word to describe foetal heart sound and the descriptions came after hesitating.

There are challenges in describing the sounds heard during auscultation. As auscultation is a subjective mode of assessment and linked to the fleeting nature of foetal sound, difficulties can arise in using a standardized terminology (Pasterkamp et al., 2016). Health professionals might agree that they hear the same sound but have different names for it Solis (2019). Bjøro and Molne (1972) also states that trained birth attendants can differentiate a normal from

an abnormal timbre and sound, but that the difference is difficult to explain verbally.

The midwives described that auscultation for foetal wellbeing using the Pinard is closely linked to experience, and they underpinned that assessing auscultation findings is a practical skill that must be learned through training. Benner (1984) describes how the acquisition of clinical skills is connected to experience, with her concept "From Novice to Expert". Learners develop competency in certain skills, over the years and through several stages of proficiency. Related, a study performed in Tanzania found that midwives prefer to use the Pinard, because that is what they were experienced with and exposed to during their midwifery training (Mdoe et al., 2018). This illustrates how important training and experience are when choosing an instrument for foetal monitoring.

The informants in this study further said that they could better hear different foetal heart sound characteristics with the Pinard, as compared to the Doppler. They explained that the Pinard gives a real and direct sound, and that they hear variations in foetal sound better without any electronic instrument interpreting it. This contrasts with the Doppler, which gives an audible simulation of foetal heartbeats via the Doppler effect (Lewis et al., 2015; Blix et al., 2019). The midwives said they only heard the frequency and no individuality with the Doppler, and they believed that the timbre they could hear with the Pinard gave them additional relevant information. Sholapurkar (2020) proposes that the foetal heart tone heard with the Pinard often are faintly noticeable, offers unnecessary information, and that IA should focus on baseline and late decelerations only. He further states that it is far more informative to observe the read-out of the Doppler display and the foetal heart rate trend, than to count the actual foetal heart rate. To our knowledge, no trial has assessed the impact on neonatal or maternal outcomes from using the Pinard versus the Doppler in high-income countries. Only one meta-analysis of four randomized controlled trials performed in low-income countries has assessed the effect of intrapartum foetal monitoring with Doppler devices versus a Pinard (Blix et al., 2019). The study reported that more foetal heartrate abnormalities were detected in women randomized to the Doppler, but there were no differences in neonatal or maternal outcomes.

The midwives interviewed in the present study further expressed that using the Pinard added closeness to the labouring woman and helped calm the birth suite, which they believed beneficial to promoting the physiological birth process. Some of the midwives said that the noise from the Doppler device could even disturb the woman in labour.

Hindley et al., (2006) interviewed 51 midwives working in two different English hospitals to evaluate their attitudes and experiences regarding the foetal monitoring of women at low obstetric risk. Their informants said that IA encouraged the midwife's close proximity to the woman and promoted the progress of labour, compared to CTG monitoring. However, the study explored IA in general, not the exact device used. Blix (2011), who explored midwifery practices in home birth settings in Norway, found that midwives consider protecting women from disturbances during labour important, and that the sound from the Doppler device is one of the things that could disturb them. We did not find any other studies describing the noise from the Doppler as a problem.

If Pinard use implies that the midwife is closer to the woman and adds calm to the birthing suite, this most likely adds more physical contact and calmness to the labouring woman. This again can promote higher oxytocin levels in the woman, which promotes the course of a physiological birth. Olza et al., (2020) state that both gently activating sensory nerves and calming interactions stimulate oxytocin release. They also found that women undergoing physiological birth desire to be in a safe environment with supportive companions. The midwife thus has a great opportunity to care for both maternal and foetal wellbeing by being close and present (Marshall et al., 2014).

The midwives in the current study, used the Pinard to collect other information than foetal heartrate, such as the position and descent of the foetus. The midwives needed to search for the area of the woman's abdomen that let them hear the foetal heart most clearly, known as the point of maximum intensity. This also allowed the midwife to assess the position and follow the descent of the foetus, as this point changes during birth with foetal cardinal movements (Marshall et al., 2014). The midwives were conscious that assessing foetal wellbeing included more than just listening to the sounds heard with the Pinard. Auscultation findings alone rarely provide crucial diagnostic information, but are a part of obtaining it, referred to as the anamneses in other healthcare fields (Melbye, 2001). In health care fields such as midwifery, this does not mean that auscultation is not significant, but that the sounds must be interpreted along with other anamneses and clinical findings.

Strengths and limitations

We included midwives who were experienced in using the Pinard for intrapartum monitoring, but from various work settings and graduation times, to grasp a diversity of meanings. Additionally, we acknowledge that an important element in this qualitative research is that there exists more than one meaning within the data, and the story we tell is partial and subjective. We recognize that our findings are subjective and contextualized and therefore that one limitation of our study is that the findings are not necessarily transferrable to other settings. However, we counteracted this subjectivity by being reflexive, and critically reflecting on the knowledge we produced and our role in producing this knowledge.

Conclusion

The present study explored the practice, skills and experiences involved in using the Pinard stethoscope for intrapartum foetal monitoring amongst Norwegian midwives who use or used the Pinard in their practice. The midwives reported that they heard other and more detailed characteristics in the foetal heart sound when listening with a Pinard compared to a Doppler device. They could hear the characteristics of normal and abnormal sounds, but they were not able to describe in detail what they heard. The practise of using the Pinard provided the midwives with additional information as well, such as the lie and descent of the foetus, and the progress of labour. The midwives experienced that the Pinard brought them physically closer to labouring women and added calm to the birth suite, which they regarded as beneficial. The midwives further identified that the skills required for using the Pinard come with experience. These findings add knowledge to the body of evidence on intrapartum IA. As the practice of using the Pinard has deteriorated amongst midwives in high income settings, it is important to document their' experiences and skills regarding the use of this tool.

Ethical approval

The participating midwives were given written information of the study and signed a consent form before inclusion. The study was approved by Regional Ethical Committee (2019/99/REK sør-øst A), by the Data Protection Officer at OUS (SD1057369) and by the Norwegian Centre for Research Data (153,660).

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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