Identifying Eligibility for Intermittent Auscultation Fetal Monitoring in Low-Risk Midwifery Patients: A Quality Improvement Project

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Authors Note

The authors of this paper recognize that not all pregnant patients identify as women and acknowledge that the use of gendered terminology in reproductive healthcare is exclusionary. Inclusive language is essential in ensuring equitable, patient-centered care for all individuals. In this paper, we have made a conscious effort to use non-gendered terminology when discussing our own data, analysis, and conclusions. However, when referencing previous research, we have retained the original terminology used in those sources to maintain accuracy and integrity in citation. We advocate for continued efforts within the medical and academic communities to promote inclusive language in reproductive healthcare literature and practice, ensuring that all patients receive respectful and affirming care.

Abstract

Background: Intermittent Auscultation (IA) is a safe, evidence-based fetal monitoring method for low-risk patients, reducing intrapartum interventions compared to continuous electronic fetal monitoring. Despite its benefits, IA remains underutilized in many hospital settings. Midwives at the study site sought to increase its use to align with the midwifery model of care.

Purpose: This quality improvement project aimed to increase the identification and documentation of IA-qualifying patients in a hospital-based midwifery practice. By implementing standardized documentation tools and provider education, the goal was to improve the consistency and accuracy of IA orders and usage.

Methods: The project used a PDSA framework over two cycles. Midwives followed an IA eligibility decisional flowsheet, and an IA smart phrase was introduced in the electronic health record admission note to streamline documentation. Chart reviews, surveys, and informal interviews assessed midwives' and staff nurses' knowledge, comfort, and barriers to IA implementation.

Results: The percentage of patients identified as eligible for IA increased from 51% pre-intervention to 70.2% post-intervention, achieving the project's primary goal. However, IA was only implemented in 36% of cases in which it was ordered, highlighting barriers to nurse-led execution. Survey results indicated that midwives improved the identification and documentation of IA-eligible candidates, yet nursing staff requested further training to increase confidence and consistency in IA use.

Conclusion: This QI project successfully improved the identification and documentation of IA eligibility in a Pacific Northwest hospital-based midwifery practice. Future efforts should focus on enhancing nursing education, integrating IA orders into standard admission protocols, and developing nurse champion roles along with continued education to build sustainable progress.

Identifying Eligibility for Intermittent Auscultation Fetal Monitoring in Low-Risk Midwifery Patients

Problem Description

The development of fetal monitoring during the intrapartum period has been marked by significant shifts in practice and philosophy in the last 80 years, reflecting broader changes in medical technology and patient care approaches. Assessment of the fetal heart rate was well established prior to the invention of continuous electronic fetal heart monitoring in the 1960s. Early management of fetal monitoring involved only intermittent auscultation (IA), a method using the Pinard horn that allowed clinicians to check the fetal heart rate manually, assessing for sudden decelerations in heart rate and overall variability much the same as today's electronic version (Smith et al., 2012). This technique, prevalent since the late 19th century, was founded on simplicity and direct clinician engagement with both mother and fetus during labor (Martin, 1998). The advent of continuous electronic fetal monitoring (cEFM), which is commonly used today, created an instant and pivotal shift from intermittent to continuous monitoring. Developed by researchers Edward Hon, Roberto Caldeyro-Barcia, and Konrad Hammacher, external probes that were held onto a patient's abdomen provided continuous data on fetal heart rates and uterine contractions. This method provided significantly more data that could be reviewed at the convenience of the provider rather than requiring direct assessment (Martin, 1998; Smith et al., 2012). The technology spread rapidly over the next 40 years, driven by the belief that it would reduce fetal neurological injuries and other complications associated with labor and delivery due to being able to observe and react to signs of possible neonatal hypoxia more rapidly (Martin, 1998).

Despite initial enthusiasm, subsequent research and clinical experience revealed that cEFM did not remarkably reduce the incidence of cerebral palsy nor other neurological injuries more than IA (Blix et al., 2019; Chen et al., 2011; Heelan-Fancher et al., 2019). Studies instead revealed that cEFM led to an average of a 48% increase in cesarean deliveries and increases in other labor interventions without

corresponding improvements in neonatal outcomes for low-risk pregnancies (Alfirevic et al., 2017). This raised concerns about the overuse of cEFM, particularly given the variability in interpreting complex fetal heart rate tracings, which could lead to unnecessary surgical interventions (American College of Nurse-Midwives [ACNM], 2015; Hindley & Thomson, 2005). These insights have led to reevaluating the use of IA, especially for low-risk pregnancies. IA offers several advantages: it is less invasive, is associated with fewer interventions, including artificial rupture of membranes, pharmaceutical labor augmentation, internal monitoring, epidurals, and cesarean deliveries, and aligns with a philosophy of care that prioritizes minimal intervention with hands-on labor support (Romano & Buxton, 2020). Current guidelines suggest that for low-risk pregnancies, intermittent auscultation is not only sufficient but safer, providing necessary monitoring without the cascade of interventions triggered by continuous cEFM (ACNM, 2015; Smith et al., 2012; Hindley & Thomson, 2005). The historical context and evolving understanding of the benefits and limitations of both monitoring methods set the stage for this quality improvement project, which is centered on increasing the utilization of IA for qualifying low-risk patients in a hospital-based midwifery practice to provide more evidenced-based, low-intervention care.

Provider, nurse, and management perspectives of IA utilization were obtained in the labor and delivery unit of a Rural Referral Center Hospital in the Pacific Northwest and demonstrated that representative members of the team believed that IA was underutilized in their facility; most could not recall the last time they performed IA and were unsure of the facilities' guidelines. The unit's policies and guidelines follow professional standards and support the use of IA for low-risk patients. However, facility culture, unit routines, and varied comfort with its implementation led to it being a rare management practice. These barriers surrounding IA are the same as those documented in numerous national studies over the last century and reflect broadly experienced challenges for both nurses and providers rather than being specific to this hospital (Hindley & Thomson, 2005; Smith et al., 2012). There was ample opportunity and staff enthusiasm supporting the increased use of IA within this

hospital unit; education, guidelines, and support were the key needs identified to continue with the quality improvement project.

Available Knowledge

The primary purpose of intrapartum fetal monitoring is to assess fetal well-being as labor progresses and identify those who are at risk of injury or hypoxia so that interventions can be applied and evaluated in a timely manner (Chen et al., 2011; Maude et al., 2015). It is equally important to note that fetal monitoring may serve as a reassurance to parents, providers, and nurses of continued fetal well-being. For this reason, the final decision-maker of whether to initiate IA or cEFM is the patient; their comfort level with the risk factors and physical application of either option deserves be respected (Smith et al., 2012). All current guidelines, as reviewed in Table 2, indicate that for low-risk pregnancies, if feasible, IA is a safe and reasonable option to be offered to patients as the default monitoring method, assuming providers and nurses are trained in its application and that hospital staffing allows it to be performed safely (Blix et al., 2019).

As noted above, cEFM is not an evidence-based intervention to reduce the incidence of either fetal hypoxia or cerebral palsy (Alfirevic et al., 2017). In fact, the use of cEFM instead of IA has an increased 1.63 relative risk (RR) of cesarean delivery (95% confidence interval [CI]) and an increased 1.15 RR in operative vaginal delivery (95% CI) with no change in maternal mortality (Martis et al., 2017). The only neonatal or maternal outcome that improved with cEFM was observed by MacDonald et al. (1985), which demonstrated a 50% increase in neonatal seizures when using IA vs. cEFM (Martis et al., 2017). However, follow up at four years of age for these infants showed no difference in rates of long-term effects, such as cerebral palsy or cognitive disabilities, were found to be equal between those who received cEFM vs. IA, concluding that there was no difference in long-term outcomes (Grant et al., 1989). Grant et al. also detailed the inclusion criteria used in the 1985 MacDonald et al. study. According

to modern guidelines, the majority of infants that received IA in that study would not have qualified due to the present of risk factors. Although few modern randomized control trials have been conducted, most obstetric professional organizations have reached the same conclusion: the increased risk of cesarean delivery, labor interventions, and operative delivery with cEFM outweighs the risk of neonatal seizures for low-risk patients when deciding to use IA (The American College of Obstetricians and Gynecologists [ACOG], 2019; ACNM, 2015).

International Guidelines

There have not been adequate randomized controlled trials performed to determine evidence-based practice for how to perform IA, such as timing of auscultation, duration, and frequency. Therefore, the development of guidelines and protocols are based on the best available scientific data and the consensus of recommendations from professional organizations (ACNM, 2015; Blix et al., 2019; The Royal Australian and New Zealand College of Obstetricians and Gynaecologists [RANZCOG], 2019). Comparison of the guidelines of IA implementation from the National Institute for Health and Care Excellence (NICE), the American College of Nurse-Midwives (ACNM), Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), the Society of Obstetricians and Gynaecologists of Canada (SOGC), International Federation of Gynecology and Obstetrics (FIGO), and The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) revealed similar recommendations with minimal variances in timing (Table 1). At the time of the initial assessment, a baseline (fetal heart rate) FHR must be determined; however, there is disagreement on how to perform the initial assessment. AWHONN advises the use of a 20-minute cEFM, while the ACNM (2015) and RANZCOG (2019) explicitly state that this is not evidence-based practice and initiation of cEFM on admission often results in unnecessary continuation of cEFM. Instead, contractions should be assessed manually on admission and a Doppler/fetoscope utilized to perform initial fetal evaluations (ACNM, 2015; RANZCOG,

2019). All organizations agreed that establishing a baseline FHR should be assessed between contractions and in the absence of fetal movement; auscultation generally should be done at least twice in a 10-minute period to ensure an accurate baseline. Baseline FHR can be reassessed through labor using this method when there is a suspected change in baseline. (Association of Women's Health, Obstetric, and Neonatal Nurses [AWHONN], 2024; RANZCOG, 2019).

Most guidelines do not recommend routine assessment of FHR in the latent phase of first-stage labor, although SOGC acknowledges it can be done approximately every hour to conform with hospital protocols (Dore & Ehman, 2020). In the active phase of the first stage, defined by ACOG guidelines as starting at 6cm of cervical dilation (First and Second Stage Labor Management, 2024), FHR assessment should occur either every 15 or 15-30 minutes (ACOG, 2019; Multiple Obstetric Guidelines Update Committee, 2022; RANZCOG, 2019). AWHONN guidelines acknowledge that active labor does not begin until 6cm, an update from prior guidelines of 4cm, but still recommends beginning auscultation every 15-30 minutes at 4cm due to the concern that contractions will begin to increase in intensity past 4cm and may increase fetal stress which should be monitored; AWHONN is the only organization to recommend this earlier shift (AWHONN, 2024). Once the second stage of labor is reached, ACNM, SOGC, and AWHONN all recommend maintaining a 15-minute frequency of auscultation if passive efforts are being used, but once maternal pushing efforts begin, there is consensus that assessment should occur every 5 minutes (ACNM, 2015; AWHONN, 2024; Dore & Ehman, 2020). In contrast, FIGO, NICE, and RANZCOG do not specify active vs. passive maternal efforts in the second stage, simply stating that auscultation should occur every 5 minutes (Lewis & Downe, 2015; Multiple Obstetric Guidelines Update Committee, 2022; RANZCOG, 2019). In addition, auscultation should be performed before and after any labor intervention is performed, such as an amniotomy, cervical exam, or administration of analgesics, to assess fetal response (RANZCOG, 2019).

Guidelines on How to Perform IA

IA can be performed using either an electronic Doppler or a Pinard horn/fetoscope. IA is occasionally conducted using cEFM that is activated solely during the contraction being monitored. However, this practice should be avoided. When cEFM data is automatically stored in the patient's electronic record, it can be reviewed later; the brief duration of these recordings makes them unreliable for accurate interpretation, which could lead to increased liability (Lyndon & Wisner, 2021). The Doppler utilizes ultrasound to translate movement in the heart to sound; these devices generally have a digital screen that displays the current fetal heart rate (Lewis & Downe, 2015). The Pinard horn or fetoscope is a type of stethoscope that uses bone conduction and requires a clinician to place their ear near the patient's abdomen to listen and count heartbeats (Lewis & Downe, 2015). Both have been shown to be effective and show no difference in outcomes when used for IA (Blix et al., 2019), however, clinicians have reported that it is difficult to count the rapid fetal heart rate accurately with a fetoscope. Some guidelines recommend having one person listen and tap their finger for each beat while a second person counts finger taps, which would increase the staff needed to perform auscultation (Maude et al., 2015). Studies have also shown a slight tendency to report a lower FHR with the fetoscope (Blix et al., 2019).

In addition to the benefits listed above, Doppler use allows less interference with the patient during auscultation and may be utilized during water immersion, while a fetoscope cannot (ACNM, 2015; Maude et al., 2015). The ACNM, SOGC, and AWHONN recommend using a muti-count method when determining FHR, which consists of counting the heartbeats for a 10-second period and then multiplying by six. This is done multiple times per minute to compare whether the 10-second average is decreasing, increasing, or remaining stable (ACNM, 2015; Dore & Ehman, 2020; Lyndon & Wisner, 2021). The ability to accurately count the auditory FHR is a mandatory skill for utilizing IA even if a Doppler with

electronic read-out is available, as these devices themselves display an averaged FHR and can be inaccurate (Huntleigh, 2022; Romano & Buxton, 2020).

When performing auscultation, a clinician must first start by performing Leopold's maneuvers to assess the fetal position and determine the position of the fetal spine, where the Doppler will be placed (ACNM, 2015). Next, the clinician palpates for uterine contractions. Guideline consensus varies on when to auscultate. RANZCOG, FIGO, and ACNM recommend that FHR should be assessed during the last portion of a contraction and shortly after (30-60 seconds), whereas SOGC and NICE recommend starting immediately after the contraction (ACNM, 2015; Dore & Ehman, 2020; Lewis & Downe, 2015; Multiple Obstetric Guidelines Update Committee, 2022; RANZCOG, 2019). The purpose of this timing is to hear any abrupt or gradual decelerations after the compression of a contraction, which could be an indication of fetal stress (Maude et al.,2015; RANZCOG, 2019). Few guidelines state the duration for auscultation. Instead, it is implied that one should listen as long as needed to determine an accurate FHR; FIGO, and NICE recommend a minimum of 1 minute (Lewis & Downe, 2015; Multiple Obstetric Guidelines Update Committee, 2022). While auscultating the FHR, the maternal heart rate should also be monitored on a routine basis, and any time a deceleration is noted, generally by checking the maternal radial pulse, to ensure it is the fetus's heartbeat, not the maternal heart rate, being heard on auscultation (Lyndon & Wisner, 2021).

The application of IA requires a nurse or provider to have frequent and close physical contact with a laboring person. This contact can serve as a benefit in and of itself, as studies have shown that the physical presence of a labor companion at the bedside without any form of interference improves maternal outcomes (Ramano et al., 2015; Smith et al., 2012). It also allows the nurse or provider to notice changes in the labor pattern that are not discernable by the remote monitoring cEFM permits, such as sudden fatigue or pain experienced by the birthing person. Too often, the application of cEFM

has been utilized as a replacement for bedside providers by allowing multiple patients to be monitored from a centralized computer station (Heelan-Fancher et al., 2005). As quoted in Shearer, (1979) as cited in Smith et al., (2012) “intrapartum fetal death is not prevented by monitors; it is prevented by an alert doctor [midwife] at the bedside of a laboring woman” (p.8). The use of IA in comparison to cEFM also decreases the habit of both patients, families, and hospital staff to “monitor watch” while in the patient’s room; providers report observing a visible monitor takes even the birthing person’s focus off their own body as they watch for the monitor to tell them when the next contraction is starting (Smith et al., 2012).

Determining Who Qualifies for IA

All current guidelines are in consensus that IA should be offered to patients who are considered “low-risk”; however, the definition of low-risk is not always clearly defined. Broadly, these are patients who do not have antenatal, maternal, or fetal risk factors that could lead to placental insufficiency or decreased fetal tolerance of labor to qualify for the use of IA initially. During the intrapartum period, they must continue to maintain a low-risk status by following a normal labor trajectory and not receive induction/augmentation medication or epidural analgesia. The IA guidelines established by RANZCO, NICE, SOGC, FIGO, and AGOC provide both antenatal and intrapartum risk factors that would exclude a patient from IA; these are compared in Table 2. All guidelines agree that maternal conditions such as hypertension and diabetes are risk factors, yet there is variation: RANZCO and NICE allow IA if the condition does not require medication management (Multiple Obstetric Guidelines Update Committee, 2022; RANZCO, 2024). There are other risk factors in which experts disagree. RANZCO states that BMI ≥ 40 is a risk factor, yet NICE explicitly does not recommend cEFM based on BMI alone. Intrapartum risk factors are similar between the guidelines; vaginal bleeding or meconium-stained amniotic fluid requires switching to cEFM along with labor dystocia or maternal pyrexia along with any abnormal FHR that is not

corrected with intervention. Some guidelines are vague in what disqualifies a patient from IA, stating things such as “maternal condition that may affect fetal well-being” (p. e167) and leaving the final determination to the provider’s judgment (ACOG, 2019). This can make providers wary of possible litigation and reduce the number of patients they determine who qualify for IA. Having a robust policy in place that gives clear guidance to providers about patient qualification for IA can increase its utilization in the hospital setting and help ensure that patients receive appropriate and evidence-based care (Romano & Buxton, 2020).

Rationale for Intervention

The initial cause-and-effect diagram for this project revealed that the primary barrier to increasing IA usage in this practice was a culture of care management on the labor and delivery unit in which routine assessments during patient admissions did not determine which fetal monitoring tool—IA or cEFM—would be most appropriate. Instead, the default was often cEFM, regardless of the patient’s presentation. There were no significant barriers in knowledge or high levels of discomfort with the safety of IA. From this perspective, the Transtheoretical Model was selected as the ideal intervention framework as it focused on changing established behavior patterns and described that changes in behavior occur in stages that must be followed (Prochaska & Velicer, 1997). This model proposes that people move through six stages of change: pre-contemplation, contemplation, preparation, action, maintenance, and termination. In order to make adequate organizational change, a group must be assessed to determine the phase they are currently in and then plan to move systematically through the next stages (Prochaska et al., 2001).

As the midwifery team had already contemplated increasing IA and the nursing management had begun implementing additional training around IA, the group was assessed to be in the “preparation” stage. The effectiveness of this intervention was assessed using the Plan-Do-Study-Act

(PDSA) framework. The PDSA cycle is a four-stage, evidence-based model that allows for continuous engagement with the change being implemented (Institute for Healthcare Improvement, n.d.). The PDSA cycle guides projects by enabling quick planning and implementation of an intervention based on identified needs, followed by continuous feedback collection and analysis, and finally, taking action based on the insights gained (Institute for Healthcare Improvement, n.d.).

Specific Aims

The purpose of this project was to increase the identification of midwifery patients who were eligible for intermittent auscultation during labor admission. As patient risk factors and autonomy influence the ability to make this change, both nurses' and midwives' comfort with the qualifying factors and implementation guidelines for intermittent auscultation were assessed at the onset and conclusion of the project. The first four-week cycle was planned to place from September 30th- October 28th, 2024, and the second four-week cycle was planned to occur from November 4th- December 2nd, 2024. To meet these aims, the following specific aims were developed:

- By September 30th, 80 percent of midwives and 40 percent of labor and delivery nurses will respond to a pre-intervention survey created in collaboration with unit practice leaders (Appendix A).
- By October 4th, 100 percent of midwives will have attested to reviewing the instructions about the IA flowsheet provided via email (Appendix B).
- By the end of the first cycle, midwives will have documented IA eligibility and whether IA use occurred among low-risk patients on the provided forms (Appendix C). The goal for documentation compliance is 60 percent of all qualifying midwifery-admitted patients.
- By the end of the second cycle, on-call midwives will have documented IA eligibility and whether IA use occurred among 70 percent of patients.

- After the completion of the intervention and the second PDSA cycle, a post-survey will be completed by 80 percent of midwives and 40 percent of labor and delivery nurses.

Methods

Context

The setting for this project was a collaborative practice consisting of seven full-scope Certified Nurse-Midwives (CNMs) and five obstetricians. Deliveries were performed at a regional medical center in the Pacific Northwest that has a Level II maternity care center with five labor rooms and a Level II nursery. The hospital also serves a second team of providers that consists of five physicians; the second team performs about 50 percent of the annual deliveries and must be considered when accounting for hospital resources, nursing availability, and practice culture. The nursing staff has a low turnover rate, and historically, the unit culture has been neutral or minorly opposed to implementing IA; this culture influences current comfort with IA practice. Based on interviews with unit nurses, midwives, and doctors, IA is currently used infrequently, and staff felt out of practice with the protocols. The midwives, specifically, were motivated to increase IA use, but they were concerned that few of their patients would be eligible, and they felt unfamiliar with some of the nuances of current monitoring guidelines, such as if patients with gestational diabetes (GDM) would require cEFM or just those who needed medication to manage their GDM. Even though IA had not been implemented frequently, nursing management was supportive of IA and had ensured staff were up to date with specific training for IA. Current unit policies require that all laboring patients receive 20 minutes of initial fetal monitoring and then default to IA unless they have high-risk criteria to rule into cEFM per provider's decision, following the 2009 AWHONN guidelines. Of note, the unit policy has not yet been updated with the 2021 AWHONN guidelines. The primary change in the guidelines is that providers no longer need to auscultate before, during, and after a contraction; only after the peak and 30-60 after completion

(Lyndon & Wisner, 2021). Although the unit policy is to default to IA for all low-risk patients, staff members report that this was not the current practice.

All patients who received antenatal care from the collaborative practice group were likely seen by both midwives and obstetricians during their prenatal care, with the midwives acting as the primary provider for vaginal deliveries and the obstetrics team available for cesarean deliveries, as backup, or to co-manage high-risk patients. Upon arrival to the hospital for labor, patients were triaged by a nurse and received 20 minutes of fetal monitoring; by that point, the midwife will generally place routine monitoring orders, which include cEFM, unless the nurse or midwife notes that the patient qualifies for IA. Obstetricians for the collaborative practice group are not routinely involved in placing fetal monitoring orders. Most laboring patients are assigned a 1:1 nurse throughout labor. In total, between 2017-2022, the hospital performed about 1000 deliveries per year, approximately half by the midwife and obstetrician collaborative practice group. The collaborative practice has an overall cesarean delivery rate of 22.9 percent, with a 12.7 percent rate for primary cesarean deliveries. Midwives attended 92 percent of the practice's vaginal deliveries in 2022. Over the last five years, the practice induction rate increased from 30 to 47 percent; patients undergoing medication induction do not qualify for IA, markedly reducing the pool of potential low-risk patients.

Description and Study of Interventions

The planned interventions took place over a 12-week period divided into two PDSA cycles. The interventions began with the creation of a pre-study and post-study survey for both midwives and labor and delivery nurses. The survey assessed their knowledge of hospital protocols surrounding IA, best practices implementing IA, benefits and risks of IA vs. cEFM, and their opinion of the importance of and personal comfort with using IA (Appendix A). This survey was quantitative, utilizing a five-point Likert scale and multiple-choice questions, as well as qualitative with open-ended answers. The post-survey

also assessed whether staff believed there were external factors that influenced the intervention. The surveys were confidential, but overall, pre- and post-survey responses were compared to demonstrate whether a change occurred in staff knowledge or opinion of IA after completing both PDSA cycles. The surveys were distributed by email on September 30th, with a reminder email the following week and flyers visible on the unit. The deadline for response was set for two weeks later, on October 13th.

A visual flowsheet was created applying hospital policies on qualifying for, implementing, maintaining, and documenting IA based on 2009 AWHONN guidelines. Of note, a hospital policy update was submitted to follow current guidelines but was not approved before the implementation of this improvement project. This flowsheet was adapted from one created by Romano and Buxton (2020), which demonstrated a successful improvement in the utilization of IA at multiple birthing facilities (Appendix B). The flowsheet was shared with providers with instructions on its intended use at admission when placing orders. Laminated copies were posted near labor and delivery computer stations for easy reference. A Smart Phrase was added to the practices labor admission note template in the EHR that prompts providers to decide which type of fetal monitoring they would order. In addition, reminder notices to assess patients on admission for IA eligibility were placed at each provider's computer station. During each PDSA cycle a chart review was conducted to identify whether IA was ordered for eligible patients and of those, whether they were placed on cEFM. Each midwife was verbally interviewed during cycle one if they admitted a qualifying patient to assess their perception of barriers and comfort with the process (Appendix E).

An identified gap in care relates to patient-informed consent for using IA in labor. Before the QI project, patients were not actively engaged in informed consent when assigned to cEFM. Continuous electronic fetal monitoring during labor was the default method of fetal heart rate monitoring at the project site. Professional guidelines suggest that certain patients may benefit from either IA or cEFM, yet

no standardized process has been identified for educating patients about these options. An evidence-based process for educating patients about the risks and benefits of fetal monitoring, either through educational guidelines or shared decision-making tools, was identified as a significant gap in the literature; current studies do not address the process of consenting patients for fetal monitoring (Megregian et al., 2024). To fill this gap, a fact sheet was created that overviews the benefits and risks of both fetal monitoring processes that provided nurses and midwives a guide for conducting their own conversations with patients regarding monitoring (Appendix B, "Safe Monitoring with Intermittent Auscultation: Quick Reference").

Prior to the start of the first PDSA cycle a chart review of September- December 2023 was conducted to assess the number of patients who qualified for IA, the number of patients who had orders written for IA, the number who received it, the duration of IA use, and whether IA was discontinued, re-initiated, after evaluation with EFM. Once the first PDSA cycle began, midwives were asked to document the IA eligibility status and usage for all labor admissions on a form; this served primarily as a prompt to remind midwives to consider initiating IA, which was one of the primary identified barriers to usage, as well as a method to track IA usage during the study (Appendix C). At the end of the PDSA cycle, one interview was conducted with midwives (Appendix E), and informal interviews were held with nurses to assess barriers to the project. A chart review was completed of all patients admitted during cycle one, and the results were compared to the midwife documentation form (Appendix C). No changes were identified as necessary, and PDSA cycle two proceeded as planned. At the end of cycle two, midwives and nurses received a post-intervention project survey to complete the QI project.

Measures and Analysis

At the end of each study cycle, all eligible labor admission charts (excluding scheduled cesarean deliveries) were assessed using the SmartPhrase ".Iaqualify" (Appendix D). The number of uses of the

SmartPhrase was compared to the number of all eligible labor admissions and was the measurement used to evaluate the uptake of the intervention by the midwives. The tracking form (Appendix C) functioned as a process measure to provide further details about the rationale for not implementing IA or why the patient did not qualify. This information was coalesced into a bar graph demonstrating the most common disqualification factors. To review the outcome of the change in the rate that IA is ordered by the midwives, a manual review of eligible labor admission notes that did not include the SmartPhase ".Iaqualify" was conducted to comprehensively identify the number of patients who could have received IA but did not and those patients who did receive IA. The final chart analysis included identifying all patients for whom IA was implemented by completing a chart review of the nursing fetal monitoring flowsheet to identify when "Doppler FHT" was charted. These data will be compared to the total number of IA-qualifying patients to identify an IA qualification-to-implementation ratio. Given the predicted number of patients during the intervention, the data set was predicted to be too small to analyze with inferential statistics and meet a significance level.

In addition, during PDSA cycle one, a verbal interview (Appendix E) was conducted with each midwife who was identified as having either ordered IA for a patient or admitted a patient who qualified for IA but did not receive an IA order. This interview identified qualitative process measures, which was reviewed to identify common themes and insights related to the decision-making process and barriers to IA utilization. Next, the pre- and post-intervention surveys were analyzed to yield both quantitative and qualitative data on processes and barriers. Readiness and staff expertise were measured on a Likert and interval rating scale in four areas: preparedness, knowledge, barriers, and comfort. A t-test was used to analyze the responses, and a statistically significant improvement in two of the four areas was considered successful in meeting the aims of this intervention. Additionally, a thematic analysis was conducted on the survey's qualitative data to identify specific barriers and knowledge deficits.

Ethical Considerations

The quality improvement intervention was focused on studying midwife behavior regarding the implementation of evidence-based labor interventions. The project, therefore, did not include research on patients and met the criteria for non-human research as determined by the implementing hospital Institutional Review Board (IRB). All data collected from the review of patient records for this intervention was recorded without any identifying information and stored on the hospital's internal servers to maintain HIPAA security. Nurse and midwife survey data was also collected and maintained on internal servers and remained confidential. Ethical considerations included evaluating the time burden of the intervention on midwives and nurses; all documentation requirements and training materials were reviewed to ensure they created a minimal impact on standard workflow. Time was taken in each PDSA cycle to review the burden created on both midwives and nursing staff. Changes were made as necessary to ensure the feasibility of continuing the quality improvement project.

Results

Progression of the Project

This project encountered several timeline adjustments during implementation due to delays in material approval, staff availability, and opportunities to extend the study period. Initially, delays in obtaining approval prevented the pre-intervention survey from being completed prior to the project's start. To avoid further delays and potentially shortening the study duration, the pre-intervention survey was conducted concurrently with the early stages of the project. It is unlikely that this change significantly affected the pre-survey data, as very few patients qualified for intermittent auscultation (IA) during the two weeks in question, meaning few, if any, staff members had the opportunity to care for a patient receiving IA before completing the survey. Additionally, the planned PDSA cycle gap, intended to allow for staff interviews and the implementation of adjustments, proved unnecessary, and the project

proceeded directly to the next cycle without interruption. The second cycle was extended from 28 to 61 days to collect additional data for comparison. Lastly, the post-intervention survey was conducted two weeks later than originally planned due to holiday schedules and approval delays. Midwives continued to evaluate and order IA for qualifying patients during this period, ensuring minimal disruption to data collection and project outcomes. A visual representation of the timeline changes is provided in Figure 1.

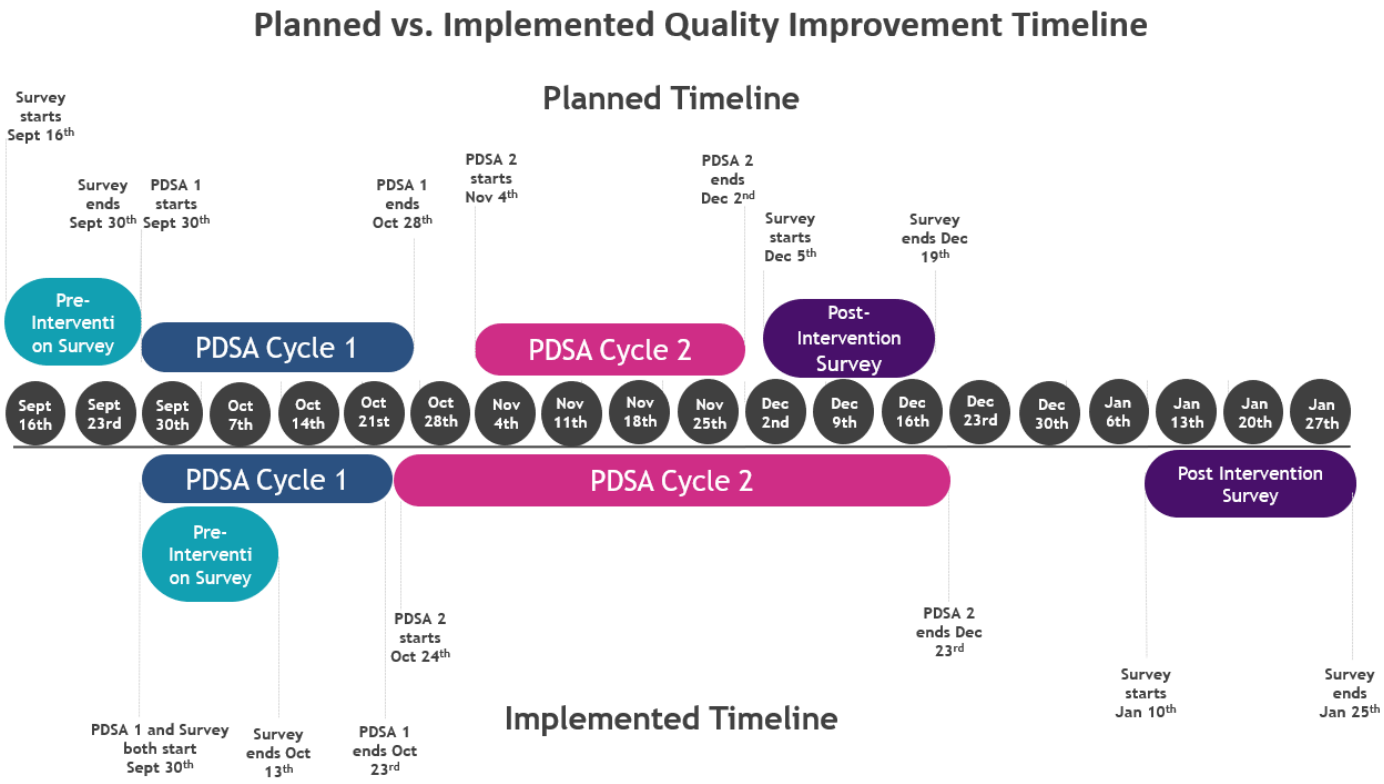

Figure 1

Measures and Process Outcomes

The key specific aim of this quality improvement project was to increase the percentage of patients accurately identified by midwives as qualifying for IA compared to the same period in the prior year. The target was to have midwives assess and document IA qualification for at least 70% of laboring patients during the study period. Progress was measured using three key data sources. First, patient records were manually reviewed for the use of the ".Iaqualify" dot phrase (Appendix D) or other documentation of fetal monitoring status in admission notes. In cycle one, midwives documented IA

qualification for 65.6% of patients (21 out of 32), which increased to 72.5% in cycle two (50 out of 69), resulting in an overall documentation rate of 70.2% and achieving the project goal. For comparison, the 2023 pre-intervention data showed that fetal monitoring status was documented in only 51% of patient records (50 out of 98). It is important to note that in regard to the 2023 records, the documentation of fetal monitoring status is not a required practice in admission notes; however, placing an order for IA monitoring was necessary.

The second method involved determining IA eligibility through manual chart reviews. This review identified patients who met IA qualifications but were not placed on IA. Supplementary data were collected using the Midwife Intermittent Auscultation Admission Documentation Form (Appendix C), which allowed midwives to document their rationale for qualifying or disqualifying patients for IA. Due to variability in provider decision-making, it was not always possible to determine retrospectively whether IA eligibility was met, as chart reviews relied on nurse documentation without a complete cEFM admission strip. However, eligibility was assumed to be accurate based on available chart review data. In cycle one, 34% of patients (11 out of 32) qualified for IA, with midwives correctly identifying six in admission notes and 14 on the documentation form. The discrepancy of over-identifying three patients on the documentation form was due to patients qualifying when they arrived but immediately receiving an epidural, placing them in the “never qualified” category upon chart review. In cycle two, 20% of patients (14 out of 69) qualified for IA, with midwives correctly identifying 7 in admission notes and four on the documentation form. Across the entire study, 25% of patients qualified for IA, and 52% of those were correctly identified, compared to 2023 pre-intervention data, where 18% of patients qualified and only 27% were correctly identified. The primary goal of the quality improvement project was met; there was a 92.6% relative increase in the identification of patients who qualify for IA by the midwives.

The midwifery group identified the primary barrier to using IA prior to this QI project as the continued decline in eligible patients. During initial interviews, all midwives anecdotally noted that the increasing prevalence of labor induction was a significant contributing factor. To assess this assumption, the reasons for IA disqualification were recorded for all patients, as shown in Figure 2. Compared to 2023 patient data, overall risk factors remained similar; however, the most notable change was an increase in the proportion of patients undergoing a trial of labor after cesarean (TOLAC), rising from 9% (N=7) in 2023 to 25% (N=19) in 2024. This trend aligns with historical data for the practice, which documented a TOLAC rate of 32% in 2019, peaking at 67% in 2022.

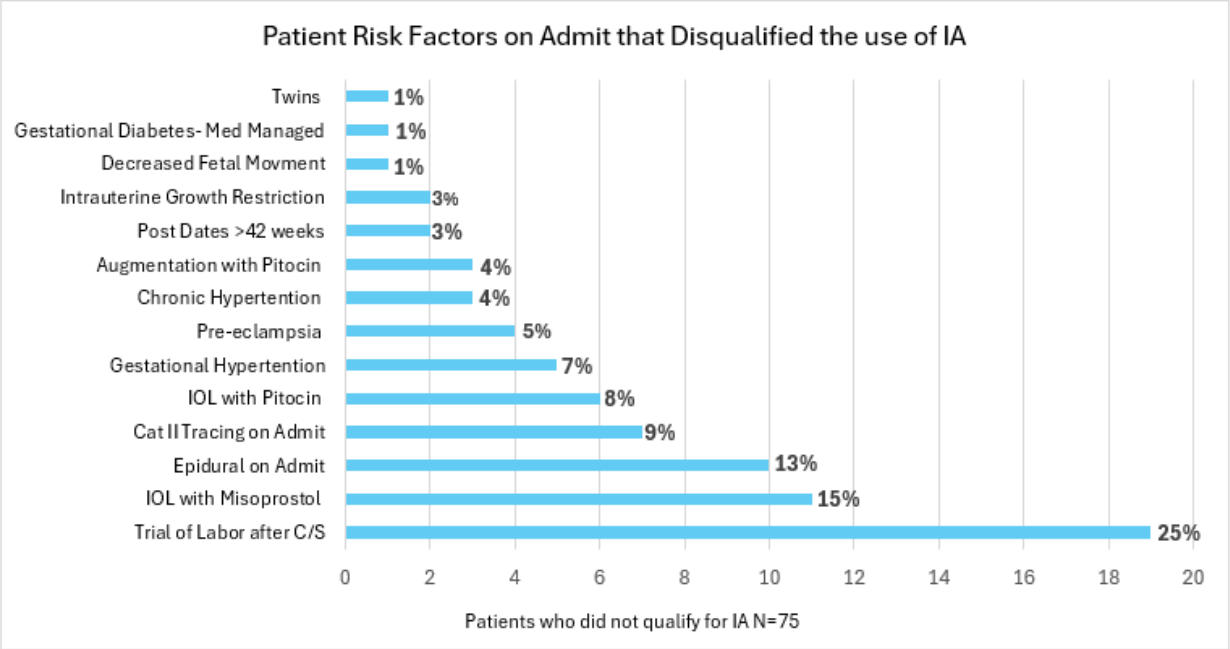

Figure 2

A secondary gap identified during the pre-project investigation was the lack of a standardized method for placing orders for IA in the EHR (electronic health record). In contrast, cEFM is automatically added to the standard labor admission order set. Historically, even when patients qualified for IA, there was no designated order set; it was given as verbal instruction to the nurse, leading to inconsistencies in

its implementation. A smart phrase, ".IAprotocol" (Appendix D), was created and introduced into the EHR to facilitate more transparent communication between midwives and nursing staff. During the study period, there were four documented instances where a patient's admission note indicated they qualified for IA. Yet, no order was placed by the midwife, resulting in IA not being implemented. Additionally, there was one instance where an order was placed, but IA was not documented as being performed, highlighting a gap in either follow-through or charting accuracy. Intermittent auscultation was successfully implemented in nine cases in which it was ordered, demonstrating that when clear orders were placed, IA was effectively conducted. The overall qualification to implementation ratio for IA during the QI project was 36%, in comparison the pre-intervention data only had a ratio of 16.7% this also showed that the intervention methods increased the application of IA not just assessment of qualification status.

The final aspect of feedback that was collected was informal interviews that were conducted with midwives at the end of each PDSA cycle regarding their views on the process of determining eligibility, ordering, documenting, and nurse communication about IA. Initially, these questions were planned to be conducted via email, but personal communication was determined to be less of a time burden for the midwives during the project. All midwives generally gave the same feedback: the eligibility handouts were helpful and clear, there were minor questions about documentation and ongoing assessment that were cleared up, and conversations with patients were not a barrier. The one issue reported in all interviews was that midwives would order IA, and it would never be performed, or it would be started and then quickly stopped; there was no communication between the nurse and midwives regarding why IA was not being used. A straightforward solution to this was not able to be implemented. Ideally, clear communication expectation roles needed to be created. This is achievable with unit policy changes but was outside the scope of this improvement project.

Survey Results

When implementing the pre-intervention survey (Appendix A), finding methods of encouraging staff participation was a known challenge. The midwife survey was sent via email and text message to all six full-time staff as well as the two locum midwives who would be working during the project. A handout with a QR code was also posted at the provider's computer station. Six out of eight, or 75% of the goal of 80% of the midwives, completed the survey; the survey was anonymous, so it is unknown whether full-time staff or the locums did not complete it. All full-time staff attested to being aware of the project and new workflow for IA implementation; instructions were emailed and posted next to the provider's computer. The nursing survey and a brief description of the project were emailed via the nurse manager to all unit nurses, although this would not reach agency staff (nurses who work for the hospital on a contract basis) who are frequently employed on the unit. Flyers containing a brief description of the project and a request to take the survey with a large QR code were posted in all staff bathrooms, the staff lunchroom, and the nurse's station for the two weeks it was open. This resulted in 14 responses, which is a 38% response rate; the original goal of 40% was not met. The same methods were used to solicit participation for the post-intervention survey; for the midwife survey, the goal of an 80% response rate was once again not met, with 50% replying, and the nurse response goal of 40% was also not met with seven responding, a rate of 19%. Full response data can be found in Appendix F.

The survey questions were designed to meet three different goals: first, to provide information about the IA QI project to staff, second to solicit feedback from staff regarding possible barriers and needs to improve the delivery of IA to patients, and thirdly to assess pre- to post-intervention change in four key areas “knowledge, comfort, barriers, and preparedness” (Appendix A). Change in the four identified areas was measured using either 0-10 interval ratings or Likert score questions, or each score was assigned a numerical value with IA positive responses being higher, and the mean change in pre-intervention to post-intervention scores were calculated for each question; this was done separately for

the RN and CNM group as shown in Table 3. While the number of respondents was too small to reach statistical significance with a Welches t-test, trends showing improvement can be determined to demonstrate improvement in mean score change ≥1.00. This occurred in one (Knowledge) of the four areas for nurses and a decrease in one (Comfort) of the four areas for midwives.

Table 3
Mean Change (sd) in Survey Scores by Clinical Role

	RN	CNM
Knowledge		
Q1	1.00 (1.94)	1.33 (2.04)
Q7	1.14 (1.39)	-0.92 (1.42)
Comfort		
Q4a	0.71 (1.08)	-1.17 (1.69)
Preparedness		
Q4b	1.00 (1.03)	0.85 (0.07)
Q4c	0.43 (0.71)	0.17 (0.42)
Barriers		
Q2	0.14 (1.17)	0.08 (0.48)

Note. Question numbers correlate to the Pre-Intervention Survey
No p-values reached statistical significance due to small survey size

Table 3

An initial concern before starting the QI project from nursing staff on the unit was that they did not have enough knowledge to be comfortable providing IA to patients. During the interviews at the end of PDSA cycle one, as well as in both surveys, this continued to be repeated feedback from nurses. One nurse provided commented in the post-intervention survey, “The staff need full training in current IA practices. What I was taught many years ago is different than the CBL [computer-based learning] that we did last year.” To measure this knowledge gap, the survey question was asked of both nurses and midwives to rank the following statement from 0 (*strongly disagree*) to 10 (*strongly agree*), see Figure 3. While verbally nurses reported they desired more training, their overall pre-intervention scores had a mean of 6.86 (SD 2.03), and they did show improvement with a higher mean post-score of 7.86 (SD 1.68) and a narrower standard deviation. Midwives also showed improvement in this personal assessment

with a pre-intervention mean score of 6.67 (SD 1.97) and a post-intervention mean score of 8.00 (SD 2.16). Table 3 reports this question as “Knowledge Q1”; see Figure 3 for a graphic comparison of responses.

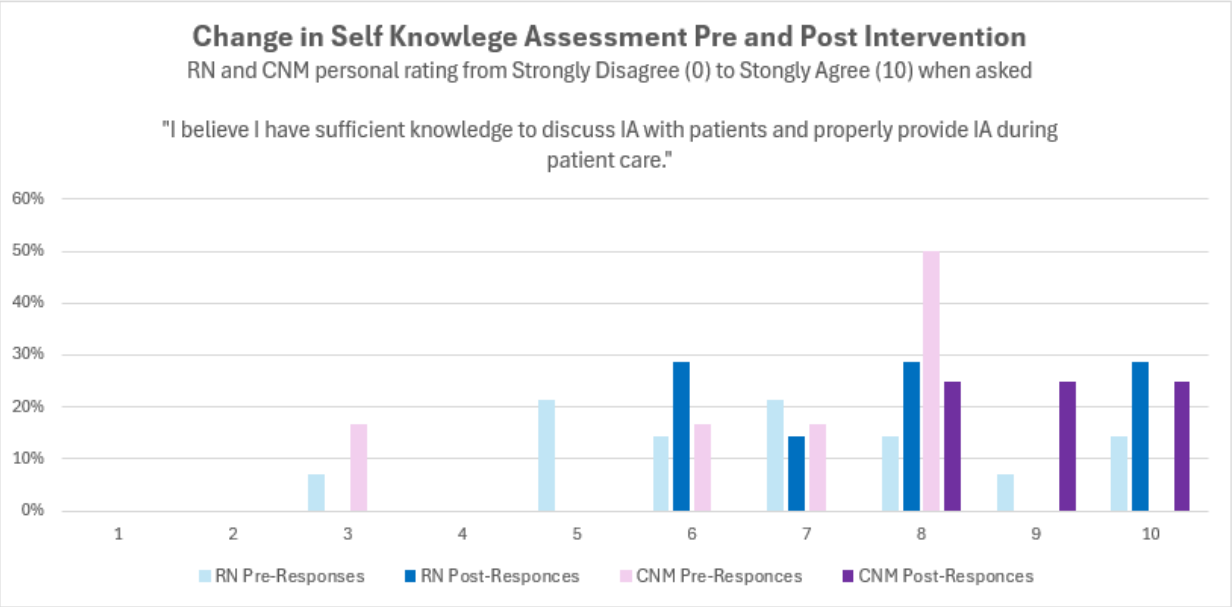

Figure 3

Another challenge that was identified during the pre-project site assessment was that midwives voiced difficulty in interpreting nurse documentation of IA in the EHR; nurses also stated that the flowsheets in the hospital EHR were not well designed to input IA readings. Per AWHONN guidelines, which are being followed by this hospital’s policy, each auscultation documentation should contain six pieces of information: presents or absences of FHR accelerations, presents or absences of FHR decelerations, if present peak or nadir of accelerations or decelerations, baseline FHR, contraction frequency, and contraction length. Also, the type of deceleration, variability, or FHR Category (I, II, III) cannot be measured (nor documented) when performing IA. When completing patient chart reviews from 2023, it was noted that those who received IA often had a variety of different information documented which could increase liability if a full assessment was not charted. To assess this aspect of IA knowledge, a select-all-that-apply survey question was created that asked, “Which of the following

items need to be documented when performing IA?". One point was given for correct answers *(accelerations present or absent, decelerations present or absent, baseline FHR, contraction frequency [i.e. 3-5 min], contraction length [i.e. 60 sec], peak or nadir for accel or decel)*, one was removed for incorrect *(late deceleration, prolonged deceleration, variability, category I, II, or III)*, and two neutral responses did not affect the score *(maternal HR and contraction strength)*; view the full question in Appendix A and results in Appendix 7, Pre-Intervention Survey Question #7. As shown in Figure 4, the nurses mean score pre-intervention was 3.29 out of a possible 6 points and improved to 4.43 post-intervention. However, the midwife score showed a decrease from a mean score of 4.67 to 3.75 for this knowledge question. As it is the nurse's responsibility to perform fetal monitoring and be aware of the documentation requirement, the improvement in their scores is positive. To improve this knowledge during the intervention, a page of the IA handout (Appendix B) was specifically created to show how and where to chart on an EHR flowsheet. In the post-intervention survey, the nurses were asked if they had seen or read this handout, and 71% replied "Yes."

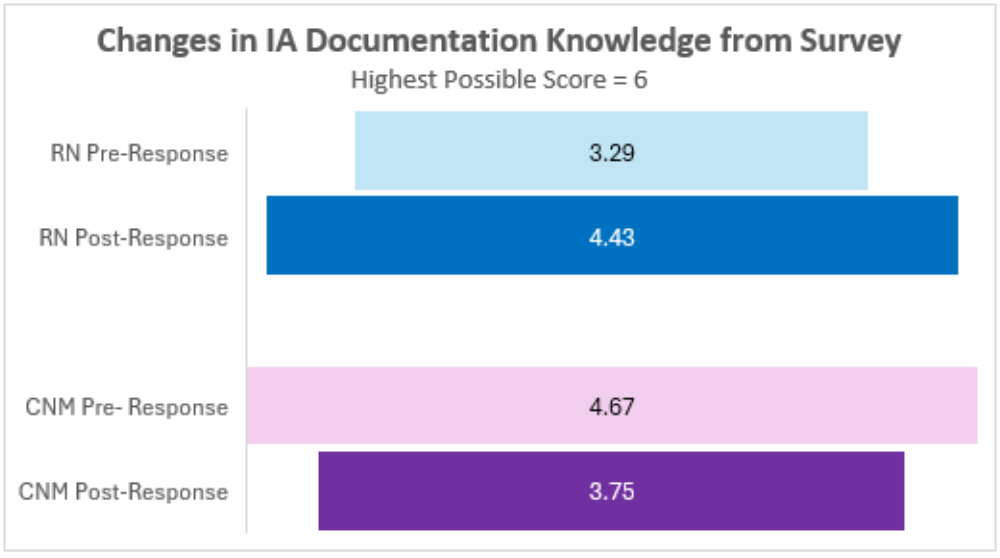

Figure 4

Discussion

Summary

The project successfully achieved its primary aim, resulting in a 92.625% relative increase in the identification of low-risk labor patients who qualified for IA by midwives compared to the previous year. This demonstrates the effectiveness of the intervention in improving midwives' identification and documentation practices for IA qualification. By implementing structured documentation tools and fostering greater awareness of IA criteria, the project addressed gaps in the consistency and accuracy of midwives' decision-making and record-keeping practices. The results suggest that targeted interventions, such as standardized processes and tools, can significantly improve adherence to best practices, ultimately supporting better patient care and outcomes. The second project aims included meeting minimum response percentages from the nurses and midwives for pre- and post-intervention surveys. In the pre-intervention survey, 75% out of the goal of 80% of the midwives and 37% out of the goal of 40% of the nurses responded, nearly meeting the goal. The post-survey had lower response rates, with only 50% out of the goal of 80% of the midwives and 19% out of the goal of 40% of the nurses responding. This low response rate limited the ability to make meaningful conclusions with the survey data.

The last aim was to assess staff readiness and expertise in four areas: preparedness, knowledge, barriers, and comfort, via pre- and post-survey questions. Improvement in two of the four areas would have met the initial goal. The nurses showed improvement in one area, knowledge, while the midwives showed a decline in comfort. However, these changes cannot be weighed too heavily with the limited number of post-intervention responses.

This quality improvement project was midwifery-led and initially driven by a desire from the midwife team to improve an aspect of the midwifery model of care they felt was not provided to their patients as fully as possible. In this respect, refocusing the team's priorities and streamlining the method

for ordering, managing, and interpreting IA has led to the full-time midwifery staff accurately identifying almost all low-risk patients who qualify for IA and opening the possibility for them to use this evidence-based monitoring method. In comparison, four similar QI projects were identified from the literature that focused on increasing the use of IA in a hospital-based setting. Three of the QI projects were expanding the use of IA in hospitals; for these projects, all three engaged in similar PDSA-type cycles and used similar methods for engaging providers to assess patients for IA eligibility to this project (Brumley et al.,2018; Danielson, 2019; Miller, 2020). The fourth QI project was initiating IA use; this project included a greater training focus but remained similar to the others using IA order sets and nurse champions (Davis, 2019). All four quickly achieved improvements in IA utilization; this aligns with the results of this project, demonstrating that staff reminders, knowledge aids such as flowcharts and handouts, and provider support can increase the identification of eligible patients for IA and use in the hospital setting.

Interpretation

The identification of antepartum risk factors that disqualify patients from the use of IA during the intervention validated midwives' concerns that an increasing number of patients were ineligible due to changes in labor management practices. This showed that labor induction has become more prevalent and reduced the proportion of IA-eligible patients. The rise in TOLAC rates is also notable, as these patients require continuous monitoring, further limiting the IA-eligible population. This rise above national averages could be explained by other local hospitals not allowing TOLACs, and the patients who desire a non-surgical birth are transferred to this hospital, increasing their total proportion. Despite these shifts, this data does reaffirm that the midwives were accurate in their assessment of barriers. However, the 25% IA qualification rate demonstrates that there are still a reasonable amount of patients that can benefit from IA. The findings illustrate the need for a proactive approach in assessing IA

eligibility, ensuring that midwives and nurses recognize and act on opportunities to implement IA whenever appropriate.

The successful implementation of IA in the nine cases where it was ordered demonstrates the effectiveness of structured workflows in facilitating its use. However, the findings suggest that placing an order alone is insufficient to ensure IA is consistently applied in practice. The gap between order placement and implementation, as highlighted in midwife feedback, underscores the need for improved interdisciplinary communication to ensure that orders are followed through. Additionally, this reinforces the necessity of integrating IA directly into standard admission templates, which could streamline the ordering process and reduce variability in its application. Future initiatives should explore strategies to ensure that IA is not only ordered but actively carried out, such as improved nurse training, clearer bedside reminders, or automated EMR prompts requiring action on IA orders.

The focus of this quality improvement project was not to increase the application or duration of IA use during labor; that would focus on the labor and delivery nurses' education and workflow, which could be the next stage of this improvement process for the unit. However, the data about the implementation of IA were collected to give context to the nursing perspective through the surveys. If nurses are not supportive of IA utilization, midwives cannot order it effectively. In total, during the project, 9 out of the qualifying 25 patients received IA (or 9 out of the 13 who had IA ordered); 13 different nurses performed IA during that time, so there was a significant amount of engagement; only two nurses were able to practice the skill more than once. In comparison, IA was only performed three times during the pre-intervention data. These findings show the need for further improvements in the implementation of IA, particularly in ensuring that midwives consistently place IA orders when patients qualify and that nurses are adequately trained and supported in performing those orders. The variability shown in IA application underscores the importance of future initiatives to enhance nursing education,

refine workflows, and foster greater interdisciplinary collaboration to optimize IA utilization in clinical practice.

Next Steps

The sustainability of QI projects can be challenging: once initiatives are completed, it is easy for the importance of the intervention to lose priority in favor of the next QI project (Lawson et al., 2018). To support sustainability, the results and recommendations of this QI project are being presented to all stakeholders on the labor and delivery team, enabling them to assess the outcomes and determine the most effective next steps for their facility. It is recommended that the unit designate, train, and support nurse champions on both the day and night shifts who can promote the use of IA and be a source of knowledge for other staff members (Lawson et al., 2018). During the project surveys, nurses were encouraged to come forward if they were interested in undertaking this role, and two people volunteered. With volunteers already available, adding this resource to the unit would be an achievable next step.

Next, it is important to maintain up-to-date laminated copies of the IA handouts (Appendix B) at the nurse's station. These have become a known resource and should remain accessible for nurses to access quickly; it would also be advisable to host digital copies in an accessible location for all staff. Maintaining yearly IA education modules and the ability to practice IA skills for all staff who care for laboring patients is recommended (Lawson et al., 2018).

Survey feedback from nursing staff regarding IA education indicated that while many recalled completing IA training, they did not use the skill frequently enough to feel confident and expressed a desire for additional training. In the post-intervention survey, the most requested training method was an online module, with some staff also preferring the creation of a self-guided practice station. Romano & Buxton (2020) developed an education program to improve IA knowledge and skills for midwives and nurses in freestanding birth centers, which demonstrated rapid improvement in confidence and skill.

Romano used this model to develop an online education module through the Institute for Perinatal Quality Improvement, which is the same module currently used in this study's hospital system. Continuing to use this training will ensure that all staff feel confident and proficient in the skill, which is expected to improve the duration and quality of IA provided. This emphasis on education and skill-building represents a critical opportunity to refine IA implementation further and enhance patient outcomes.

This hospital's provider team consists of a collaborative group of midwives and physicians employed by the hospital as well as a private practice physician-only group. While midwives primarily manage labor patients for the collaborative practice group on labor and delivery, physicians do as well. In this project's interventions, physician-admitted labor patients were excluded, but in the future, IA education and information could be expanded to that part of the team, helping to ensure all patients receive the same level of care. One outlying factor identified in the design of this project was whether to include the data of patients who were managed by locum midwives; for similar reasons that the patients managed by the group physicians were not included in the data, these midwives were not necessarily expected to stay up-to-date on the facility quality improvement initiatives or make changes to their practice. It was ultimately decided that those numbers should be included as the patients they managed were still receiving midwifery care from the group and would expect consistency. The data showed that while one of the locum midwives was on-call, eight patients qualified for IA and were not identified. Without including those results, the full-time midwives of the group would have identified 76% of the qualifying patients, resulting in an 181.5% increase in the primary goal compared with the previous year. This indicates that one of the next steps towards increasing the use of IA in the practice would be to provide education and support to any locum midwives working at the hospital regarding offering IA when appropriate; this would improve overall patient care by standardizing the evidence-based care offered.

Limitations

The primary limitation of this quality improvement project was the limited number of patients in the practice who qualified for intermittent auscultation (IA). During the project, 58% of laboring patients were disqualified for IA before admission due to factors such as prenatal complications, a history of cesarean section, or planned induction of labor. Additionally, 17% of admitted patients were excluded from IA eligibility due to immediate epidural placement or fetal heart rate abnormalities. As a result, only 25% of laboring patients were eligible for IA during the study period, translating to an estimated nine opportunities per month to implement IA. This small sample size restricted the study's internal validity and limited its ability to produce more robust conclusions. Extending the project's duration to six or 12 months would have provided a larger sample size and yielded more generalizable results. Another confounding factor contributing to the low number of IA-qualifying patients is the extensive availability of community-based birthing options in the area, such as birth centers and home births, which likely attracted a higher proportion of low-risk patients who may otherwise have delivered in the hospital setting. This context introduces a potential selection bias, further limiting the applicability of the findings to broader populations.

Conclusion

Intermittent auscultation is a safe and evidence-based method of fetal monitoring for low-risk patients, offering comparable neonatal outcomes to cEFM while reducing unnecessary interventions such as cesarean deliveries (ACNM, 2015; Blix et al., 2019; Chen et al., 2011; Heelan-Fancher et al., 2019). Despite these documented benefits of IA, cEFM remains the dominant method of fetal monitoring in many hospital settings (Heelan-Fancher et al., 2019; Sartwelle & Arda, 2017), including the study site, where the midwife team sought to increase its use to align more closely with the midwifery model of care, which emphasizes physiologic birth and minimal intervention. This quality improvement project successfully increased the identification and documentation of IA eligibility among midwives,

demonstrating that structured interventions such as standardized documentation tools and education aids can improve clinical decision-making. The framework established in this project has the potential to be successfully applied in other facilities, provided they have existing IA protocols and a baseline level of unit education. The handouts developed during the project proved valuable in helping staff review and familiarize themselves with IA protocols and ensured more standardized documentation. While the project achieved a 92.6% relative increase in the identification of qualifying patients, the limited number of eligible patients and the short study duration restricted broader generalizability. Future efforts should focus on sustaining these improvements by incorporating ongoing staff education, fostering interdisciplinary communication, and addressing barriers to nurse implementation of IA.

In terms of sustainability, the improvements achieved are likely to persist as long as the midwifery team continues to prioritize IA assessment as part of their practice. Maintaining IA handouts and flowcharts on the unit, along with the prompt to document fetal monitoring status in the admission note template, will further support long-term adherence. Additionally, expanding IA training for nursing staff and locum midwives ensures that all eligible patients receive appropriate fetal monitoring. Introducing nursing champion roles could help reinforce IA utilization and support continuous skill development among staff. As with any quality improvement initiative, continued evaluation and adaptation will be essential to maintain progress, refine best practices, and ensure that IA remains a viable and effective option for low-risk patients.

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Table 1

Comparison of Intermittent Auscultation Guidelines from Professional Organizations

	Frequency of Auscultation 1st Stage	Frequency of Auscultation 2nd Stage- Passive	Frequency of Auscultation 2nd Stage- Pushing	Timing of Auscultation	Duration of Auscultation	Admission Electronic Monitoring	Other Recommendations
ACNM	15- 30 minutes (during active phase)	15 minutes	5 minutes	Last portion of contraction and shortly after		Against an initial 20 min ECG	recommended muti-count method
FIGO	15 minutes (in active phase)	5 minutes (no specification of active/passive)	5 minutes (no specification of active/passive)	during and at least 30 sec after contraction	At least 60 seconds		
SOGC	1 hour in latent stage 15-30 minutes (active)	15-30 minutes	5 minutes	immediately after contraction for 30-60 seconds		Use IA for initial assement unless high risk	recommended muti-count method
NICE	15 minutes (in established i.e. active labor)	5 minutes (no specification of active/passive)	5 minutes (no specification of active/passive)	immediately after contraction	At least 1 minute	No initial 20 min recommended	
RANZCOG	15-30 minutes (in active phase)	5 minutes or with every contraction (no specification of active/passive)	5 minutes or with every contraction (no specification of active/passive)	Towards end of contraction and for 30-60 secs after		Decied for each pt, ECG not universally recommended	
AWHONN	15-30 minutes (4cm-10cm of dilation)	15 minutes	5 -15 minutes	From peak of contraction and for 30-60 secs after		Initial 20 minute CEFM	recommended muti-count method

Note.
ACNM = American College of Nurse-Midwives
ACOG = American College of Obstetricians and Gynecologists
NICE = National Institute for Health and Care Excellence
SOGC = Society of Obstetricians and Gynaecologists of Canada
FIGO = International Federation of Gynecology and Obstetrics
RANZCOG = Royal Australian and New Zealand College of Obstetricians and Gynaecologists
AWHONN = Association of Women's Health, Obstetric and Neonatal Nurses

Table 1

Comparison of Auscultation Guidelines from Professional Organizations

Table 2

Comparison of Guidelines Intrapartum and Antenatal Risk Factors that Exclude a Patient from IA

Antenatal Risk Factors						
	RANZCOG	NICE	SOGC	FIGO	ACOG
	diabetes where medication is indicated or poorly controlled, or with fetal macrosomia	pre-existing diabetes (type 1 or type 2) and gestational diabetes requiring medication.	Diabetes: pre-existing and gestational	Maternal diabetes	maternal condition that may affect fetal well-being (eg, prior cesarean scar, diabetes, hypertensive disease)
	essential hypertension or pre-eclampsia	any hypertensive disorder needing medication	Hypertensive disorders of pregnancy	pre-eclampsia	maternal condition that may affect fetal well-being (eg, prior cesarean scar, diabetes, hypertensive disease)
	uterine scar (e.g. previous caesarean section)	full thickness uterine scar*	Previous CD/trial of labour after CD	Previous uterine scar	prior cesarean scar
	suspected or confirmed intrauterine growth restriction	fetal growth restriction (estimated fetal weight below 3rd centile)	Intrauterine growth restriction	Abnormal Fetal Growth	intrauterine growth restriction
	multiple pregnancy	multiple gestation	Multiple pregnancy	Multiple Pregnancy	
	known fetal abnormality which requires monitoring		Significant fetal abnormality (compatible with life)	Abnormal fetal growth	increased risk of developing fetal acidemia during labor (eg, congenital anomalies)
	other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse)	heart disease in whom fluid balance is critical for optimal cardiac function	Medical disease (e.g.: cardiac, significant anemia., hyperthyroidism, vascular and/or renal disease)	Serious previous maternal health conditions	maternal condition that may affect fetal well-being
	fetal movements altered unless there has been demonstrated wellbeing and return to normal	decreased fetal movements	Maternal perception of reduced or absent fetal movements	abnormal or decreased fetal movements	abnormal or undetermined fetal test results before giving birth or at initial admission
	oligohydramnios (MVP < 2cm or AFI < 5cm) or polyhydramnios (MVP > 8cm or AFI > 20cm or as defined by local referral guidelines)	anhydramnios or polyhydramnios	Oligohydramnios or Polyhydramnios	Oligohydramnios or Polyhydramnios	
	prolonged pregnancy ≥ 42 weeks	> 42 weeks gestation	Post term pregnancy (>42 weeks gestation)	>42 weeks gestation	
	breech presentation	non-cephalic presentation	Breech presentation	non-cephalic presentation	
	antepartum haemorrhage	any vaginal blood loss other than a show	Antepartum hemorrhage	antenatal vaginal hemorrhage	
	prolonged rupture of membranes (≥ 24 hours)	prolonged ruptured membranes (but women who are already in established labour at 24 hours after their membranes ruptured do not need CTG unless there are other concerns)	Prolonged ROM at term (>24 hours)	rupture of membranes lasting > 24 hours	
	abnormal antenatal CTG		Abnormal BPP or NST	abnormal antenatal cardiotocography readings	abnormal or undetermined fetal test results before giving birth or at initial admission
	abnormal Doppler umbilical artery velocimetry		Abnormal umbilical artery Doppler velocimetry	abnormal doppler	abnormal or undetermined fetal test results before giving birth or at initial admission
	abnormal placental cord insertion		Velamentous cord insertion		abnormal or undetermined fetal test results before giving birth or at initial admission
			Single umbilical artery		abnormal or undetermined fetal test results before giving birth or at initial admission
	abnormal cerebroplacental ratio				abnormal or undetermined fetal test results before giving birth or at initial admission
	morbid obesity (BMI ≥ 40)	*Explicitly do not recommend cEFM as default based on BMI alone*			
	maternal age ≥ 42				
	abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcomes (e.g. low PAPP-A <0.4MoM or low PlGF)				
		Maternal preference for cEFM			
	Isoimmunization		Isoimmunization		maternal condition that may affect fetal well-being
			Following trauma or Motor vehicle collision (EFM recommended for a minimum of 4–6 hours)		maternal condition that may affect fetal well-being

	RANZCOG	NICE	SOGC	FIGO	ACOG
Intrapartum Risk Factors	meconium or blood stained liquor	the presence of meconium	Meconium staining of the amniotic fluid	No fresh or thick meconium	meconium staining
	abnormal vaginal bleeding in labour	intrapartum bleeding	Vaginal bleeding in labour		intrapartum bleeding
	induction of labour with prostaglandin/oxytocin or oxytocin augmentation	use of oxytocin	Oxytocin induction or augmentation	No labor induction or augmentation	oxytocin induction or augmentation of labor
	regional anaesthesia (e.g. epidural or spinal)	insertion of regional analgesia	Combined spinal–epidural analgesia	No epidural analgesia	
	maternal pyrexia ≥ 38°C	maternal pyrexia or suspected chorioamnionitis	Intrauterine infection/chorioamnionitis	No maternal temperature >38°C	
	prolonged first stage as defined by referral guidelines OR prolonged second stage as defined by referral guidelines	confirmed delay in the first or second stage of labour	Labour dystocia	Active first stage lasting < 12 hours OR Second stage lasting <1 hour	
	tachysystole (more than five active labour contractions in ten minutes, without fetal heart rate abnormalities) OR uterine hypertonus (contractions lasting more than two minutes in duration or contractions ocurring within 60 seconds of each other, without fetal heart rate abnormalities) OR uterine hyperstimulation (either tachysystole or uterine hypertonus with fetal heart rate abnormalities).	contractions that last longer than 2 minutes, or 5 or more contractions in 10 minutes	Tachysystole	Normal frequency of contractions	
	pre-term labour less than 37 completed weeks		Prematurity (<37 weeks)		
	abnormal auscultation or CTG		Abnormal FHR on auscultation- FHR arrhythmia	Clearly audible fetal heart rate sounds in normal range	
		cannot differentiate between maternal and fetal HR	Difficulties in reliably determining UA and/or FHR with IA	Clearly audible fetal heart rate sounds in normal range	
	absent liquor following amniotomy				
		sepsis or suspected sepsis			
		abnormal pain			
		hypertension			
		proteinuria			
		maternal tachycardia >120BPM			

*NICE stated in an updated publication that they no longer recommend cEFM for prior cesarean section alone
RANZCOG = Royal Australian and New Zealand College of Obstetricians and Gynaecologists
NICE = National Institute for Health and Care Excellence
SOGC = Society of Obstetricians and Gynaecologists of Canada
FIGO = International Federation of Gynecology and Obstetrics
ACOG = American College of Obstetricians and Gynecologists

Appendix A

Pre and Post-Intervention Survey for Nurses and Midwives

Pre-Intervention IA QI Survey - RN and CNM

1. I believe I have sufficient knowledge to discuss IA with patients and properly provide IA during patient care.

   Rate from 0 (strongly disagree) – 10 (strongly agree)

2. My personal feelings about using intermittent auscultation to monitor patients lean towards
   a. Strongly positive
   b. Mildly Positive
   c. Neutral
   d. Mildly negative
   e. Strongly negative

3. My feelings from the last question are primarily influenced by
   a. I am comfortable with my skills in IA
   b. I do not completely understand how to use IA during labor care
   c. The practical challenges of manually monitoring a patient (such as use of Doppler or frequency of assessment)
   d. I don't know the unit policy on IA well
   e. I believe cEFM is safer for low-risk patients
   f. I believe IA is safer for low-risk patients
   g. I believe IA reduces labor interventions
   h. I believe cEFM is preferred by patients
   i. I believe IA is preferred by patients
   j. I feel like I don't know the right way to perform and/or document IA
   k. I am concerned about the legal ramifications of IA
   l. Other (write in)_____

4. Rate the following statements:
   a. I am confident in performing (and/or interpreting) intermittent auscultation.
   b. I have enough support in my workplace to use intermittent auscultation
   c. If I have questions regarding IA I know where to find answers/ assistance.
      i. Strongly agree
      ii. Agree
      iii. Somewhat agree
      iv. Somewhat disagree
      v. Disagree
      vi. Strongly disagree

5. Considering your other priorities during labor management, how important do you think it is to use IA as the primary method of fetal surveillance with healthy low-risk patients?
   Rate from 0 (not important) – 10 (very important)

6. Rate the following statements regarding the most common patient reactions you have witnessed regarding fetal monitoring:
   a. I see patients becoming stressed by continuously watching the fetal heart rate
   b. I see patients comforted by being able to hear the fetal heart rate with cEFM
   c. I see patients uncomfortable or minimizing movement due to the cEFM
   d. I see patients uncomfortable with nurses applying the doppler when doing IA
      i. Never
      ii. Rarely
      iii. Sometimes
      iv. Frequently
      v. Almost Always

7. Which of the following items need to be documented when performing IA? Select all that apply
   a. Accelerations present or absent
   b. Decelerations present or absent
   c. Maternal HR
   d. Baseline Fetal HR
   e. Late Deceleration
   f. Prolonged deceleration
   g. Variability
   h. Contraction strength
   i. Contraction frequency (i.e. 3-5 min)
   j. Contraction length (i.e. 60 sec)
   k. Peak or nadir for accel or decel
   l. Category I, II, or III

8. Which of the following is true regarding IA evidence and guidelines? True/False
   a. There is an increased risk for fetal hypoxia when IA is used for longer than 8 continuous hours
   b. American College of Obstetricians and Gynecologists recommends providing the option of IA for low-risk patients
   c. Continuous fetal monitoring is not an evidence-based intervention for low-risk pregnancies
   d. Current guidelines recommend a 20-minute NST every 4 hours when using IA.
   e. After identifying a Category II tracing when using IA, cEFM should be initiated immediately.

9. When performing the 6-second count method during auscultation you:
   a. Count the fetal heartbeats for 6 seconds then multiply by 10 to determine FHR
   b. Count the fetal heartbeats for 10 seconds then multiply by 6 to determine FHR
   c. Note the FHR displayed on Doppler every 6 seconds during a contraction

6-sec count	13	13	14	14	15	13	13	13
Rate	130	130	140	140	150	130	130	130

10. While performing auscultation during and after a contraction, you write down the following 6-sec counts. Assuming the baseline was previously determined to be 130bpm what would you document?
    a. Accelerations present
    b. Decelerations present
    c. Both accelerations and decelerations present
    d. Accelerations and decelerations absent

11. Do you have any feedback or suggestions you would like to add about this QI project?
    Write in_____

Post- Intervention IA QI Survey - RN

1. In the last 12 weeks, did you perform IA when monitoring a patient?
    a. Yes
    b. No
    c. Don't remember

2. If you did perform IA do you have any feedback~~,~~ regarding:
    a. The monitoring process: _____
    b. Communication with the midwife: _____
    c. Documentation: _____
    d. I did not perform IA

3. In the last 12 weeks, did you have a patient that you thought qualified for IA but did not receive IA?
    a. Yes
    b. No
    c. Not sure

12. I believe I have sufficient knowledge to discuss IA with patients and properly provide IA during patient care.

    Rate from 0 (strongly disagree) – 10 (strongly agree)

4. My personal feelings about using intermittent auscultation to monitor patients lean towards
    a. Strongly positive

b. Mildly Positive
c. Neutral
d. Mildly negative
e. Strongly negative

5. My feelings from the previous question (#5) are primarily influenced by: (select all that apply)
    m. I am comfortable with my skills in IA
    n. I do not completely understand how to use IA during labor care
    o. The practical challenges of manually monitoring a patient (such as use of doppler or frequency of assessment)
    p. I don't know the unit policy on IA well
    q. I believe cEFM is safer for low-risk patients
    r. I believe IA is safer for low-risk patients
    s. I believe IA reduces labor interventions
    t. I believe cEFM is preferred by patients
    u. I believe IA is preferred by patients
    v. I feel like I do not know the right way to perform and/or document IA
    w. I am concerned about the legal ramifications of IA
    x. Other (write in) _____

6. Rate the following statements:
    a. I am confident in performing (and/or interpreting) intermittent auscultation.
    b. I have enough support in my workplace to use intermittent auscultation
    c. If I have questions regarding IA I know where to find answers/ assistance.
        i. Strongly agree
        ii. Agree
        iii. Somewhat agree
        iv. Somewhat disagree
        v. Disagree
        vi. Strongly disagree

7. Considering your other priorities during labor management, how important do you think it is to use IA as the primary method of fetal surveillance with healthy, low-risk patients?
    a. Rate from 0 (not important) – 10 (very important)

8. Rate the following statements regarding the most common patient reactions you have witnessed regarding fetal monitoring:
    a. I see patients becoming stressed by continuously watching the fetal heart rate
    b. I see patients comforted by being able to hear the fetal heart rate with cEFM
    c. I see patients uncomfortable or minimizing movement due to the cEFM
    d. I see patients uncomfortable with nurses applying the doppler when doing IA
        i. Never
        ii. Rarely

iii. Sometimes
iv. Frequently
v. Almost Always

9. Which of the following items need to be documented when performing IA? Select all that apply
    a. Accelerations present or absent
    b. Decelerations present or absent
    c. Maternal HR
    d. Baseline Fetal HR
    e. Late Deceleration
    f. Prolonged deceleration
    g. Variability
    h. Contraction strength
    i. Contraction frequency (i.e. 3-5 min)
    j. Contraction length (i.e. 60 sec)
    k. Peak or nadir for accel or decel
    l. Category I, II, or III

10. Have you seen and/ or read the IA handout and flowsheet located at the nurse's station?
    a. Yes
    b. No
    c. Not aware it exists

11. If you have read the handout, do you have feedback on ways to improve the resource?
    Write in: _____

12. In the last survey, it was commonly said that staff would appreciate more training on current IA guidelines and practice on how to perform IA. Which method of education would you be most interested in if available?
    a. Online module
    b. In-person skills day
    c. 1-1 training with nurse champions
    d. Self-guided practice station made available
    e. Write in_____

Post- Intervention IA QI Survey - CNM

1. In the last 12 weeks, did you order for a patient to be monitored by IA?
    a. Yes
    b. No
    c. Don’t remember

2. If you ordered IA do you have any feedback, about:
    a. The monitoring process: _____
    b. Communication with the nurse: _____
    c. Documentation: _____
    d. I did not have a patient on IA

3. In the last 12 weeks, did you have a patient that you thought qualified for IA but did not receive IA?
    a. Yes
    b. No
    c. Not sure

3a. If you ordered IA and it was not initiated, what do you feel was the most common cause?

Write in: _____

1. I believe I have sufficient knowledge to discuss IA with patients and properly provide IA during patient care.

    Rate from 0 (strongly disagree) – 10 (strongly agree)

4. My personal feelings about using intermittent auscultation to monitor patients lean towards
    a. Strongly positive
    b. Mildly Positive
    c. Neutral
    d. Mildly negative
    e. Strongly negative

5. My feelings from the last question are primarily influenced by: (Select all that apply)
    a. I am comfortable with my skills in IA
    b. I do not completely understand how to use IA during labor care
    c. The practical challenges of manually monitoring a patient (such as use of doppler or frequency of assessment)
    d. I don't know the unit policy on IA well
    e. I believe cEFM is safer for low-risk patients
    f. I believe IA is safer for low-risk patients
    g. I believe IA reduces labor interventions
    h. I believe cEFM is preferred by patients
    i. I believe IA is preferred by patients
    j. I feel like I don't know the right way to perform and/or document IA
    k. I am concerned about the legal ramifications of IA
    l. Other (write in)

6. Rate the following statements:
    a. I am confident in performing (and/or interpreting) intermittent auscultation.
    b. I have enough support in my workplace to use intermittent auscultation
    c. If I have questions regarding IA I know where to find answers/ assistance.
        i. Strongly agree
        ii. Agree
        iii. Somewhat agree
        iv. Somewhat disagree
        v. Disagree
        vi. Strongly disagree

7. Considering your other priorities during labor management, how important do you think it is to use IA as the primary method of fetal surveillance with healthy low-risk patients?
    Rate from 0 (not important) – 10 (very important)

8. Rate the following statements regarding the most common patient reactions you have witnessed regarding fetal monitoring:
    a. I see patients becoming stressed by continuously watching the fetal heart rate
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    c. I see patients uncomfortable or minimizing movement due to the cEFM
    d. I see patients uncomfortable with nurses applying the doppler when doing IA
        i. Never
        ii. Rarely
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        iv. Frequently
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9. Which of the following items need to be documented when performing IA? Select all that apply
    a. Accelerations present or absent
    b. Decelerations present or absent
    c. Maternal HR
    d. Baseline Fetal HR
    e. Late Deceleration
    f. Prolonged deceleration
    g. Variability
    h. Contraction strength
    i. Contraction frequency (i.e. 3-5 min)
    j. Contraction length (i.e. 60 sec)
    k. Peak or nadir for accel or decel
    l. Category I, II, or III

10. Have you seen and/or read the IA handout and flowsheet located at the nurses/ provider station?

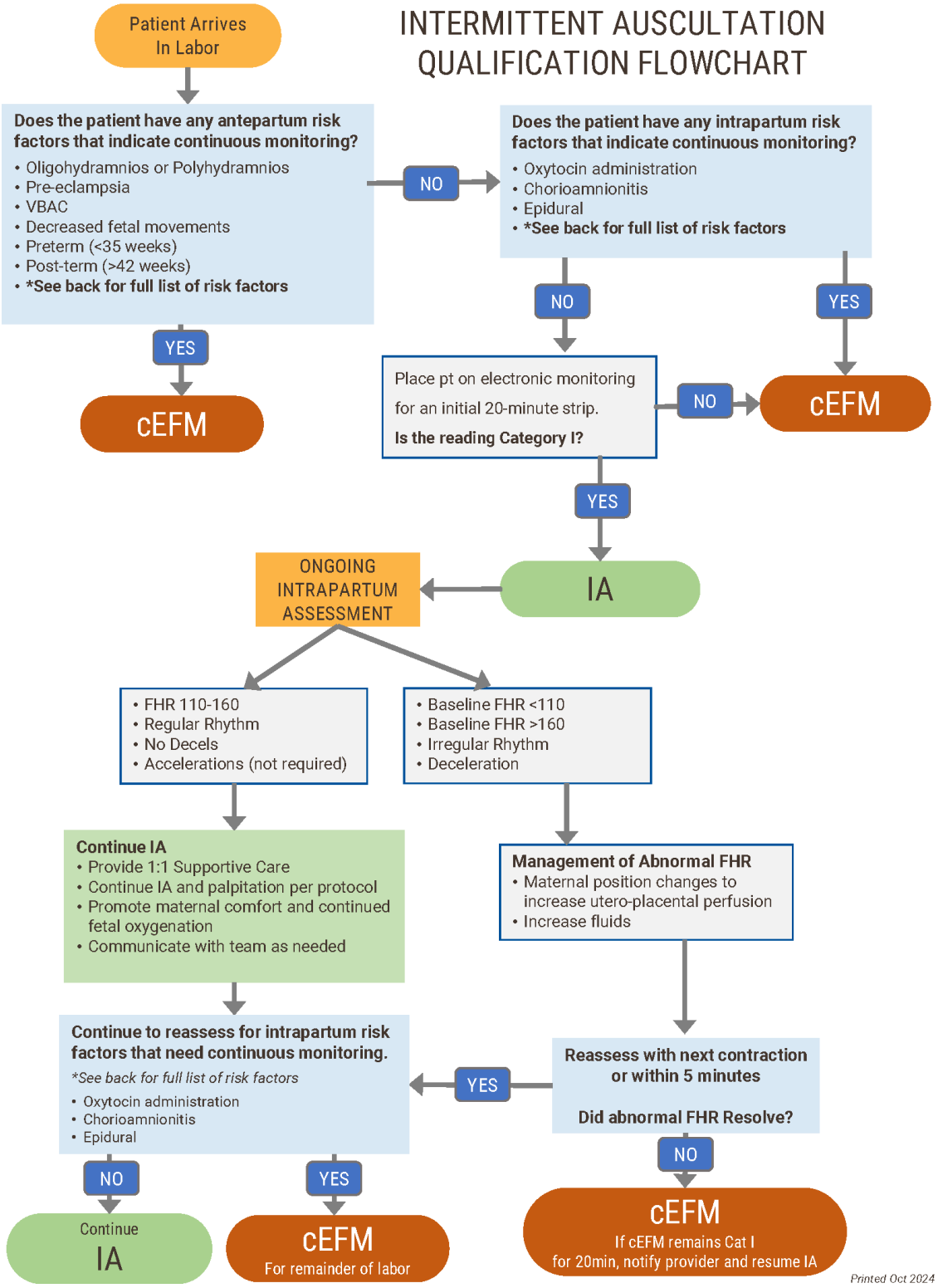
a. Yes
b. No
c. Not aware it exists

11. If you have read the handout, do you have feedback on ways to improve the resource?
    Write in: _____

12. In the last survey, it was commonly said that staff would appreciate more training on current IA guidelines and practice on how to perform IA. Which method of education would you be most interested in if available?
    a. Online module
    b. In-person skills day
    c. 1-1 training with nurse champions
    d. Self-guided practice station made available
    e. Write in

Appendix B

Intermittent Auscultation Flowsheet and Nurse Handout



Antepartum Risk Factors Disqualifying Intermittent Auscultation During Labor: Organizational Guidelines

SHS recommendations are highlighted in blue

- **Chronic renal disease** SHS, RANZCOG, SOGC, FIGO, ACOG*
- **Symptomatic Lupus Erythematosus** SHS, ACOG*
- **Complex cardiac disease** SHS, NICE, SOGC, FIGO, ACOG*
- **Hemoglobinopathies** SHS, ACOG*
- **Antiphospholipid Antibody Syndrome** SHS, ACOG*
- **Hyperthyroidism (poorly controlled)** SHS, SOGC, ACOG*
- **Isoimmunization** SHS, SOGC, ACOG*
- **Multiple Gestations** SHS, RANZCOG, NICE, SOGC, FIGO
- **VBAC** SHS, RANZCOG, SOGC, FIGO, ACOG
- **Oligohydramnios or Polyhydramnios** SHS, RANZCOG, NICE, SOGC, FIGO
- **Intrauterine growth restriction** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Preterm (<35 weeks)** SHS
  - **(<37 weeks)** RANZCOG, SOGC
- **Post-term (>42 weeks)** SHS, RANZCOG, NICE, SOGC, FIGO
- **Decreased fetal movements** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Previously unexplained fetal demise** SHS
- **Pre-eclampsia** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Diabetes preexisting or gestational** SOGC, FIGO, ACOG
  - **Diabetes requiring medication** SHS, RANZCOG, NICE
- **Hypertension** SHS, ACOG
  - **Hypertensive disorders of pregnancy** SOGC
  - **Any hypertensive disorder needing medication** NICE
  - **Essential hypertension** RANZCOG
- **Prolonged ROM >24 hours** RANZCOG, NICE, SOGC, FIGO
- **Abnormal placental cord insertion** RANZCOG, SOGC
- **Abnormal BPP or NST** RANZCOG, SOGC, FIGO

*ACOG states "maternal condition that may affect fetal well-being (eg, prior cesarean scar, diabetes, hypertensive disease)" as a risk factor, this is being extrapolated to include the maternal conditions above.

INTERMITTENT AUSCULTATION QUALIFICATION FLOWCHART

Intrapartum Risk Factors Disqualifying Intermittent Auscultation During Labor: Organizational Guidelines

SHS recommendations are highlighted in blue

- **Oxytocin administration** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Prostaglandin administration*** RANZCOG
  *Continuous monitoring required by other SHS policy
- **Confirmed labor dystocia**, RANZCOG, NICE, SOGC, FIGO
- **Tachysystole** RANZCOG, NICE, SOGC, FIGO
- **Chorioamnionitis** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Epidural** SHS, RANZCOG, NICE, SOGC, FIGO, ACOG
- **Meconium** RANZCOG, NICE, SOGC, FIGO, ACOG
- **Abnormal vaginal bleeding** RANZCOG, NICE, SOGC, FIGO
- **Difficulties in reliably determining UA and/or FHR with IA** NICE, SOGC, FIGO

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SHS- Samaritan Health Services
ACOG- American College of Obstetricians and Gynecologists
NICE- National Institute for Health and Care Excellence
SOGC- Society of Obstetricians and Gynaecologists of Canada
FIGO- International Federation of Gynecology and Obstetrics
RANZCOG- Royal Australian and New Zealand College of Obstetricians and Gynaecologists

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SAFE MONITORING WITH INTERMITTENT AUSCULTATION: A QUICK REFERENCE

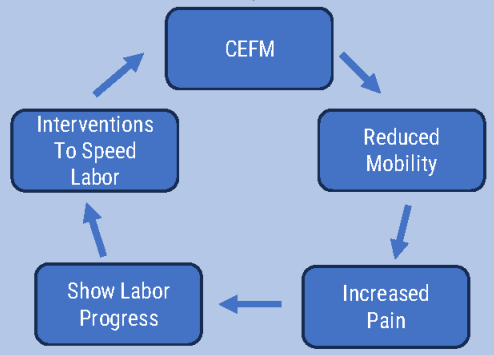
Intermittent auscultation is a safe, effective, and evidence-based method that can be a great alternative to continuous monitoring for many patients.

Research supports IA for low-risk pregnancies (1-3)

The Cochrane systematic review with more than 37,000 patients **comparing IA and CEFM** found (1):

- Reduced likelihood of cesarean birth with IA
- Reduced likelihood of instrumental vaginal birth with IA
- No difference in metabolic acidosis
- No difference in perinatal death
- No difference in cerebral palsy
- No difference in NICU admissions
- Increase in neonatal seizure with IA of 50%
  - Follow-up with these infants has shown no difference in long-term neurological outcomes. (1, 5)
  - The baseline risk of seizure for all neonates, including high-risk, is 1 to 3 per 1000 live births (13). This would mean a possible increase to 2 to 6 per 1000 live births.
  - Monitoring 667 labors with cEFM is needed to prevent 1 case of neonatal seizures (1).

Impact of Continuous Electronic Fetal Monitoring on Labor Experience (7)



Observational studies have shown that **many people prefer IA in labor** (11), cEFM can cause anxiety due to "monitor watching," and **cEFM reduces mobility**; even with wireless devices, patients report feeling that they need to sit still (11). Patients might prefer cEFM and a **patient-informed choice should be primary decision maker.** (4,6)

Restricted mobility in labor is associated with slower labor progress, higher chance of cesarean birth, and higher pain. (2,8,10)

Talking to Patients About Intermittent Auscultation

When discussing IA with patients, it's important to communicate clearly the rationale, benefits, and risks. Below are some key points and simple language you can use:

Reassure about Safety and Efficacy:

- "For most women with low-risk pregnancies, listening to your baby's heartbeat at regular intervals is just as safe as continuous monitoring. It helps us make sure your baby is doing well while allowing you more freedom to move during labor. If we have any concerns about what we hear, we can easily switch to the monitor to make sure everything is okay"

Discuss Fewer Interventions:

- "Research shows that continuous monitoring can sometimes lead to more interventions like C-sections. Intermittent monitoring gives us the information we need to keep you and your baby safe while supporting a low-intervention birth process."

Emphasize Personalization and Comfort:

- "This approach allows us to focus more on your individual needs and create a calm, supportive environment for your birth. It's less intrusive and helps maintain a positive, less medicalized experience for you."

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HOW TO PERFORM INTERMITTENT AUSCULTATION

6-Second Count Method

1. Locate the area on pt abdomen where you can hear fetal heart tones, generally this can be found by palpating for the fetal spine.
2. Check maternal radial pulse to ensure you are hearing fetal pulse.
3. Make sure you have the ability to see a clock face while auscultating while still allowing the patient freedom of movement.
4. When a contraction begins place the Doppler in the area previously found and start listening in for the heart rate rhythm.
5. It can be helpful to tap your finger along with each heartbeat.
6. Count the number of finger taps or beats that occur in 6 seconds, record this number.
7. Continue counting 6 second intervals and recording until 30-60 seconds after the contraction is complete.
8. You should have a list of numbers such as 13, 13, 13, 14, 14, 15, 13, 13.
9. Multiply each number by 10 to determine the bpm during those 6 seconds.
10. Example: 13 beats in 6-seconds = 13 x 10 = 130 bpm.
11. The recorded numbers will demonstrate the presence of an acceleration or deceleration; the example to the right shows an acceleration with a peak of 140 and a baseline of 120.

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IA is an auditory nursing skill, different from the interpretation of CEFM which is visual

Baseline FHR Assessment

1. Baseline FHR should be reassessed after an intervention or notable maternal change in labor.
2. Assess between contractions, when the uterus is soft to palpation.
3. Ensure the fetus is not moving.
4. Listen and count for 2 minutes, either consecutive or non-consecutive, as long as they are in the same 10-minute period of time, and average the rate to determine a single number, such as 135bpm.

- The 6-second count method is recommended because Doppler readouts are not always accurate, and it is hard to determine the duration of a change in heart rate without a manual count.
- After the initial 20-minute electronic fetal monitoring strip is completed patients on IA do not require cEFM check-ins unless ordered by the provider or if they qualify for conversion to cEFM
- Manually timing contractions is a great way to involve family members or phone apps can be helpful.
- IA can only determine if a deceleration is present, but it cannot identify the type, do not document early, late, variable, or prolonged. You can chart the the nadir.

6s Count (consecutive)									
Beats per 6s Count	12	12	13	14	14	13	12	12	12
Rate	**120**	**120**	**130**	**140**	**140**	**130**	**120**	**120**	**120**

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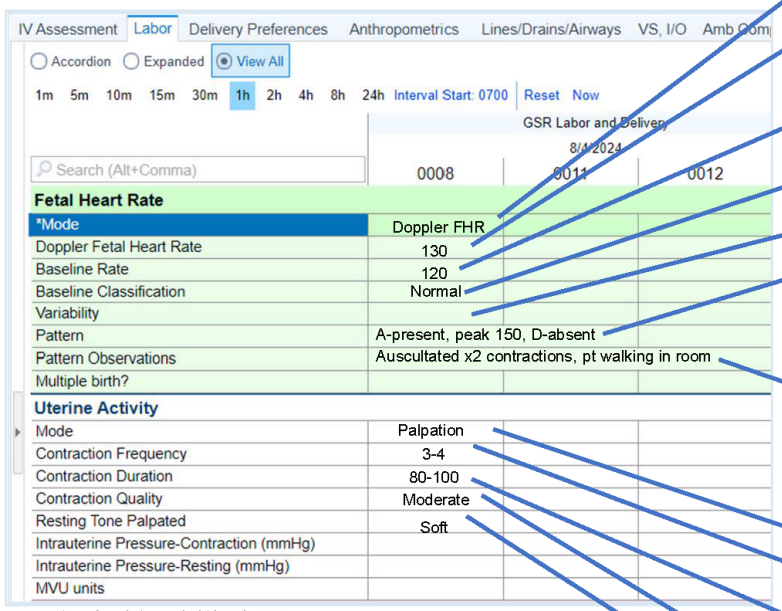
Romano, A. M., & Buxton, M. (2020). A Multimethod improvement project to strengthen intermittent auscultation practice among nurse-midwives and nurses. *Journal of Midwifery & Women's Health*, *65*(3), 362–369. doi.org/10.1111/jmwh.13113

DOCUMENTING INTERMITTENT AUSCULTATION



IV Assessment | Labor | Delivery Preferences | Anthropometrics | Lines/Drains/Airways | VS, I/O | Amb Com

Accordion | Expanded | View All

1m 5m 10m 15m 30m 1h 2h 4h 8h 24h Interval Start: 0700 | Reset | Now

GSR Labor and Delivery

8/4/2024

Search (Alt+Comma)

	0008	0011	0012
Fetal Heart Rate			
*Mode	Doppler FHR		
Doppler Fetal Heart Rate	130		
Baseline Rate	120		
Baseline Classification	Normal		
Variability			
Pattern	A-present, peak 150, D-absent		
Pattern Observations	Auscultated x2 contractions, pt walking in room		
Multiple birth?			
Uterine Activity			
Mode	Palpation		
Contraction Frequency	3-4		
Contraction Duration	80-100		
Contraction Quality	Moderate		
Resting Tone Palpated	Soft		
Intrauterine Pressure-Contraction (mmHg)			
Intrauterine Pressure-Resting (mmHg)			
MVU units			

^Above form is located within Epic EMR

Mode- FHR Doppler

Doppler Fetal Heart Rate - The average baseline FHR you auscultated during this contraction

Baseline Rate- The baseline rate auscultated in between contractions and in the absence of fetal movement. This is not required for every auscultation, recheck baseline after interventions or with maternal change

Baseline Classification- Normal (110-160)/ Tachycardic (>160)/ Bradycardic (<110) - document classification along with a new baseline rate assessment

Variability- Cannot be determined with IA

Pattern- IA cannot determine the type of decel. Select "other" and document the presence or absence of accels and decels along with the peak or nadir if either is present.
Example: *"A-present, peak 140, D-absent" OR "A-absent, D-present, nadir 100" OR " A-absent, D-absent"*

Pattern Observations- Not required documentation but you can add more details about the auscultation, IA is sometimes easier to understand in narrative form.
Example: *accel not detected, 20-sec decel to nadir of 130, swift return to baseline by the end of the contraction. Pt moved to hands and knees, plan to increase auscultation frequency to Q5min until resolved or convert to CEFM.*

Mode- Palpation

Contraction Frequency- How often are contractions occurring? "2-4" = every 2-4 minutes

Contraction Duration- Total duration of contraction in seconds you were present for, "60 sec" or if you were present for multiple contractions give a range "60-90".

Contraction Quality- same as cEFM, Mild/ Moderate/ Firm/ Pushing

Resting Tone Palpated- Same as cEFM, Soft/Rigid

When To Assess

PHASE	FREQUENCY
Latent phase <4cm	Q 1hour
Latent phase 4-5cm	Q 15-30 minutes
Active phase ≥6cm	Q 15-30 minutes
Second Stage (passive fetal descent)	Q 15 minutes
Second stage (active pushing)	Q 5-15 minutes

Lyndon, A. & Wisner, K. (2021). *Fetal heart monitoring principles and practice* (6th edition). Association of Women's Health, Obstetric and Neonatal Nurses; Kendall Hunt Publishing.

Notify Your Provider If Your Patient Meets Criteria For Conversion to cEFM

Decelerations auscultated over 2 contractions

Baseline FHR >160

Baseline FHR <110

Irregular Rhythm

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Midwife Intermittent Auscultation Admission Documentation Form

Please document all admissions except planned c/s

Admit Date	MRN	G&P	Did pt qualify for IA at any time?	If not, why?	Did pt receive IA?	If not, why? Or why was IA stopped	Comments
9/2	*5550650*	*G2P1*	*Y*		*N*	*Pt declined*	*Pt wanted to be able to hear FHT*
9/2	*5550651*	*G1P0*	*N*	*IOL, oligo*			
9/2	*5550652*	*G3P1*	*Y*		*Y*		*Switched to cEFM during second stage*
61.							
62.							
63.							
64.							
65.							
66.							
67.							
68.							
69.							
70.							
71.							
72.							

Appendix D

Labor Admission Note SmartPhrase

.IAqualify

>Fetal monitoring- Drop down options

a. Intermittent auscultation, orders placed

b. Continuous electronic monitoring

Disappearing information: does the patient have any risk factors that would disqualify them from IA? See IA handout.

*When ordering IA use the order set "**fetal monitoring- intermittent**" then add "**.IAprotocol**" in the order comments.*

.IAprotocol

Frequency of IA

Latent phase- >4cm Q1h, 4-5cm Q15-30 minutes
Active phase- ≥6cm Q15-30 minutes
Second stage (passive fetal decent)- Q15 minutes
Second stage (active pushing)- Q5-15 minutes

If a deceleration is present, reposition and auscultate with the next contraction or within 5 minutes. If a deceleration is still present, initiate cEFM. If no deceleration is present in 20 minutes of cEFM and FHR remains Cat I, IA can be reinitiated.

Only an initial 20 min NST is needed, no further ones needed during labor unless indicated by FHR or provider.

Notify Provider:

- EFM is initiated
- FHR <90 or >160

Appendix E

Standardized Interview Questions for Midwives After Ordering IA

Questions for midwife who ordered IA for an eligible patient*

1. How did you feel about the orders and initiation process for IA?
2. Were there barriers with ordering/documentation or nursing staff?
3. Did you or the nurse discuss IA with the patient prior to monitoring?
4. If a patient qualified for IA but was not initiated or was discontinued, can you explain why that happened from your perspective?
5. Is there any feedback you would like to give about the process of using IA?

Questions for midwife who admitted IA eligible patient* who was placed on cEFM

1. Did you feel the resources for determining IA eligibility were helpful in this situation?
2. Do you recall the reason for using cEFM instead of IA in this situation?
3. Did you have any discussion with nursing staff about IA with this patient?
4. Is there any feedback you would like to give about the process of using IA?
5. Were there any changes that could have been made that would have allowed this patient to be offered IA?

**For the purpose of this interview, IA eligibility is determined by a retrospective chart review and may not be accurate as the provider could have access to more medical information that was not readily identified during the review.*

Appendix F Table 1 and 2

Responses to Pre-and Post-Intervention Surveys

Appendix F. Table 1		
Response Data from Pre-Intervention Survey RN and CNM		
Question	**RN Responses (N=14)**	**CNM Responses (N=6)**
Q1: Knowledge about IA (0-10)	Mean: 6.86 (SD: 2.03)	Mean: 6.67 (SD: 1.97)
Q2: Feelings towards IA	Strongly Positive: 3, Mildly Positive: 4, Neutral: 3, Mildly Negative: 4, Strongly Negative: 0	Strongly Positive: 4, Mildly Positive: 2, Neutral: 0, Mildly Negative: 0, Strongly Negative: 0
Q3: Influencing factors on IA feelings	Most common: Practical challenges of manually monitoring a patient with IA, I am comfortable with my skills in IA	Most common: I believe IA reduces labor interventions, I believe IA is safer for low-risk patients, I believe IA is preferred by patients
Q4A: Confidence in performing IA	Strongly Agree: 2, Agree: 7, Somewhat Agree: 4, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 1	Strongly Agree: 2, Agree: 2, Somewhat Agree: 1, Somewhat Disagree: 0, Disagree: 1, Strongly Disagree: 0
Q4B: Workplace support for IA	Strongly Agree: 1, Agree: 7, Somewhat Agree: 4, Somewhat Disagree: 1, Disagree: 1, Strongly Disagree: 0	Strongly Agree: 1, Agree: 2, Somewhat Agree: 3, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0
Q4C: Knowledge of IA resources	Strongly Agree: 3, Agree: 8, Somewhat Agree: 2, Somewhat Disagree: 1, Disagree: 0, Strongly Disagree: 0	Strongly Agree: 2, Agree: 4, Somewhat Agree: 0, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0
Q5: Importance of IA during labor management (0-10)	Mean: 5.93 (SD: 2.2)	Mean: 7.0 (SD: 1.79)
Q6A: I see pt stressed by cEFM	Almost Always: 0, Frequently: 1, Sometimes: 4, Rarely: 8, Never: 1	Almost Always: 0, Frequently: 0, Sometimes: 4, Rarely: 2, Never: 0
Q6B: I see pt comforted by listening to cEFM	Almost Always: 3, Frequently: 6, Sometimes: 4, Rarely: 1, Never: 0	Almost Always: 0, Frequently: 2, Sometimes: 4, Rarely: 0, Never: 0
Q6C: I see pt minimizing movement with cEFM	Almost Always: 0, Frequently: 2, Sometimes: 6, Rarely: 6, Never: 0	Almost Always: 0, Frequently: 4, Sometimes: 2, Rarely: 0, Never: 0
Q7: Which needs to be documented when performing IA, select all that apply: Listed are the total number of times each answer was selected	**Accelerations present or absent**: 9 **Decelerations present or absent**: 13 *Maternal HR*: 13 **Baseline Fetal HR**: 12 Late Deceleration: 3 Prolonged deceleration: 2 Variability: 1	**Accelerations present or absent**: 5 **Decelerations present or absent**: 6 *Maternal HR*: 4 **Baseline Fetal HR**: 6 Late Deceleration: 1 Prolonged deceleration: 1 Variability: 0

Bold = correct *Italicized = neutral* Regular = incorrect +1 point for correct -1 point for incorrect 0 for neutral Highest possible score=6	*Contraction strength*: 7 **Contraction frequency (i.e. 3-5 min**): 7 **Contraction length (i.e. 60 sec)**: 10 **Peak or nadir for accel or decel**: 1 Category I, II, or III: 0 Mean Score: 3.29 (SD: 1.38)	*Contraction strength*: 2 **Contraction frequency (i.e. 3-5 min**): 5 **Contraction length (i.e. 60 sec)**: 5 **Peak or nadir for accel or decel**: 3 Category I, II, or III: 0 Mean Score: 4.67 (SD: 1.5)
Q8 A-E: Which of the following is true regarding IA evidence and guidelines? True/ False answers **Correct answers are is bolded**		
Q8A: There is an increased risk for fetal hypoxia when IA is used for longer than 8 continuous hours	True: 1 **False: 13**	True: 0 **False: 6**
Q8B: American College of Obstetricians and Gynecologists recommends providing the option of IA for low-risk patients	**True: 14** False: 0	**True: 6** False: 0
Q8C: Continuous fetal monitoring is not an evidence-based intervention for low-risk pregnancies	**True: 11** False: 3	**True: 4** False: 2
Q8D: Current guidelines recommend a 20-minute NST every 4 hours when using IA.	True: 5 **False: 9**	True: 2 **False: 4**
Q8E: After identifying a Category II tracing when using IA, cEFM should be initiated immediately *this question was determined to be poorly worded	True: 12 **False: 2**	True: 4 **False: 2**
Q9: When performing the 6-second count method during auscultation you:	**A: Count the fetal heartbeats for 6 seconds then multiply by 10 to determine FHR : 11** B: Count the fetal heartbeats for 10 seconds then multiply by 6 to determine FHR: 2	**A: Count the fetal heartbeats for 6 seconds then multiply by 10 to determine FHR : 6** B: Count the fetal heartbeats for 10 seconds then multiply by 6 to determine FHR: 0

	C: Note the FHR displayed on Doppler every 6 seconds during a contraction: 1	C: Note the FHR displayed on Doppler every 6 seconds during a contraction: 0
Q10: Interpret the FHR in 6-sec count chart presented	**A: Accelerations present: 13** B: Decelerations present: 0 C: Both accelerations and decelerations present: 1 D: Accelerations and decelerations absent: 0	**A: Accelerations present: 6** B: Decelerations present: 0 C: Both accelerations and decelerations present: 0 D: Accelerations and decelerations absent: 0
Q11: Do you have any feedback or suggestion about this QI project?	Common Themes: Need more training on IA, Provider preference of cEFM, Challenging to monitor pt when walking around	No feedback given

Appendix F. Table 2		
Response Data from Post-Intervention Survey RN and CNM		
Question	**RN Responses (N=7)**	**CNM Responses (N=4)**
Q1 RN: In the last 12 weeks, did you perform IA when monitoring a patient?	A: Yes: 4 B: No: 3 C: Don't remember: 0	
Q1 CNM: In the last 12 weeks, did you order for a patient to be monitored by IA?		A: Yes: 3 B: No: 1 C: Don't remember: 0
Q2 RN: If you did perform IA do you have any feedback, regarding:	A: The monitoring process: 1 B: Communication with midwife: 0 C: Documentation: 3 D: I did not perform IA: 0	
Q2 CNM: If you ordered IA do you have any feedback, about:		A. The monitoring process: 1 B. Communication with the nurse: 2 C. Documentation: 0 D.I did not have a patient on IA: 0
Q3: In the last 12 weeks, did you have a patient that you thought qualified for IA but did not receive IA?	A: Yes: 3 B: No: 4 C: Not sure: 0	A: Yes: 1 B: No: 2 C: Not sure: 1
Q3A CNM: If you ordered IA and it was not initiated, what do you feel was the most common cause?		Common Themes: Was always initiated when ordered, Not communicating directly with nurses, Change in status (pain meds, augmentation, etc.)
Q4: Knowledge about IA (0-10)	Mean: 7.86 (SD: 1.68)	Mean: 8.0 (SD: 2.16)

Q5: Feelings towards IA	Strongly Positive: 2, Mildly Positive: 2, Neutral: 1, Mildly Negative: 2, Strongly Negative: 0	Strongly Positive: 3, Mildly Positive: 1, Neutral: 0, Mildly Negative: 0, Strongly Negative: 0
Q6: Influencing factors on IA feelings	Most common: Practical challenges of manually monitoring a patient with IA, Feels like they are disrupting pt with doppler	Most common: I believe IA is safer for low-risk patients, I believe IA reduces labor interventions
Q7A: Confidence in performing IA	Strongly Agree: 2, Agree: 5, Somewhat Agree: 0, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0	Strongly Agree: 0, Agree: 2, Somewhat Agree: 0, Somewhat Disagree: 1, Disagree: 0, Strongly Disagree: 1
Q7B: Workplace support for IA	Strongly Agree: 0, Agree: 5, Somewhat Agree: 1, Somewhat Disagree: 0, Disagree: 1, Strongly Disagree: 0	Strongly Agree: 0, Agree: 3, Somewhat Agree: 1, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0
Q7C: Knowledge of IA resources	Strongly Agree: 1, Agree: 6, Somewhat Agree: 0, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0	Strongly Agree: 0, Agree: 4, Somewhat Agree: 0, Somewhat Disagree: 0, Disagree: 0, Strongly Disagree: 0
Q8: Importance of IA during labor management (0-10)	Mean: 5.86 (SD: 1.46)	Mean: 7.25 (SD: 2.06)
Q9A: I see pt stressed by cEFM	Almost Always: 0, Frequently: 0, Sometimes: 2, Rarely: 5, Never: 0	Almost Always: 0, Frequently: 0, Sometimes: 3, Rarely: 1, Never: 0
Q9B: I see pt comforted by listening to cEFM	Almost Always: 1, Frequently: 4, Sometimes: 2, Rarely: 0, Never: 0	Almost Always: 0, Frequently: 1, Sometimes: 3, Rarely: 0, Never: 0
Q9C: I see pt minimizing movement with cEFM	Almost Always: 0, Frequently: 1, Sometimes: 4, Rarely: 2, Never: 0	Almost Always: 0, Frequently: 2, Sometimes: 2, Rarely: 0, Never: 0
Q10: Which needs to be documented when performing IA, select all that apply: Listed are the total number of times each answer was selected **Bold = correct** *Italicized = neutral* Regular = incorrect +1 point for correct -1 point for incorrect 0 for neutral Highest possible score=6	**Accelerations present or absent**: 6 **Decelerations present or absent**: 6 *Maternal HR*: 6 **Baseline Fetal HR**: 7 Late Deceleration: 1 Prolonged deceleration: 1 Variability: 0 *Contraction strength*: 6 **Contraction frequency (i.e. 3-5 min)**: 5 **Contraction length (i.e. 60 sec)**: 7 **Peak or nadir for accel or decel**: 2 Category I, II, or III: 0 Mean Score: 4.43 (SD: 1.13)	**Accelerations present or absent**: 2 **Decelerations present or absent**: 3 *Maternal HR*: 3 **Baseline Fetal HR**: 4 Late Deceleration: 1 Prolonged deceleration: 2 Variability: 0 *Contraction strength*: 2 **Contraction frequency (i.e. 3-5 min)**: 4 **Contraction length (i.e. 60 sec)**: 4 **Peak or nadir for accel or decel**: 1 Category I, II, or III: 0 Mean Score: 3.75 (SD: 1.26)

Q11: Have you seen and/ or read the IA handout and flowsheet located at the nurse's station?	A: Yes: 5 B: No: 0 C: Not aware it exists: 2	A: Yes: 3 B: No: 0 C: Not aware it exists: 1
Q12: If you have read the handout, do you have feedback on ways to improve the resource?	Common Themes: Great resource, very helpful	No Feeback
Q13: Which method of IA education would you be most interested in if available?	A: Online module: 5 B: In-person skills day: 0 C: 1-1 training with nurse champions: 1 D: Self-guided practice station made available: 1 E: Write in: 0	A: Online module: 3 B: In-person skills day: 0 C: 1-1 training with nurse champions: 0 D: Self-guided practice station made available: 1 E: Write in: 0