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Reviewing pain management options for patients in active labor

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Abstract: Pain perception and preferences for pain management are unique to each woman in labor. This article provides an overview of the physiology of labor pain, discusses available nonpharmacologic and pharmacologic approaches to managing pain during active labor, and discusses potential benefits and risks for each option.

Keywords: aromatherapy, childbirth, dance labor, effleurage, epidural analgesia, hydrotherapy, hypnotherapy, labor, neuraxial analgesia, nitrous oxide, sterile water injections

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MANY WOMEN will experience pregnancy and childbirth at some point in their life. In 2018, the provisional number of births in the US was 3,788,235, which is an estimated birth rate of 59 births per 1,000 women ages 15 to 44.[1] Opinions and attitudes about labor pain management have changed significantly over the years as our understanding of pain's deleterious effects has evolved. Uncontrolled pain can lead to anxiety and adverse postnatal effects.[2] In addition, a negative birth experience, whether from a poor outcome or inadequate pain relief, is a predisposing factor for developing posttraumatic stress disorder.[3]

The American Society of Anesthesiologists and American College of Obstetricians and Gynecologists (ACOG) both state that laboring women should be offered pain management when desired.[4] Nurses are in a key position to help patients understand the options and make informed choices.

Pain perception and preferences for pain management are unique to the laboring woman. Nurses and healthcare providers must be knowledgeable about the various pain management modalities to help each woman make informed choices consistent with her personal preferences. This article provides an overview of the physiology of labor pain, discusses available nonpharmacologic and pharmacologic approaches to managing pain during active labor,

and discusses potential benefits and risks for each option.

Physiology of labor pain

During the first and second stages of labor, women experience two main types of pain in varying degrees: visceral pain and somatic pain (see *Three stages of labor*).

- Visceral pain is related primarily to uterine contractions and cervical dilation. This pain is typically diffuse in the lower abdomen, back, and upper thigh area and is caused by nerve stimulation in the T10-L1 area. It is best mitigated by regional anesthesia.[5]
- Somatic pain occurs as the fetus navigates downward through the pelvis. This pain has various sources, including pressure and distension of the pelvic muscles and perineal tissue, as well as tissue ischemia.[5-7] It is usually more localized and is more responsive to pudendal nerve blocks and localized therapy.[5]

The extent of a woman's pain experience depends on many maternal and fetal factors, including fetal size and positioning, parity, maternal age, preparation for childbirth, anxiety, prior pain experiences, and culture.[5,6] Nurses should keep in mind that a patient's culture may influence how stoic or vocal she may be in labor as well as her personal preferences regarding pain management and support.[6]

Studies have identified how genotyping may influence the timing of requests for pain management and dosing requirements for medications. According to Landau and Smiley, the evidence suggests that White and Asian women carrying a G118 allele may require more pain medication based on their genetic composition compared with Hispanic and Black women.[8] More investigational studies are taking place on this topic.

According to ACOG, many options for nonpharmacologic pain relief are available. Most of these measures work by altering the woman's perception of pain. Although data on their effectiveness are limited, ACOG finds nonpharmacologic pain relief measures reasonable to utilize because they are not associated with adverse reactions when used appropriately.[9] ACOG also supports utilizing a multifaceted pain evaluation instrument such as a 10-point coping scale. By asking the woman to rate how well she is coping with her pain right now, this approach goes beyond the use of a 0-to-10 pain rating scale.[10,11]

The following discussion reviews common nonpharmacologic interventions that may be used during active labor. Incorporating these options into the pain management regimen may increase maternal satisfaction without causing adverse reactions and may also reduce the need for further obstetrical interventions.[12]

Mind-body modalities

The course of labor is influenced by the 5 Ps: psyche or perception, passageway, passenger, position, and powers.[6] A woman's psyche, one of the crucial components of the birth process, may positively or negatively impact the labor course. Mind-body modalities promote a positive impact. Having a relaxed state of mind may not only help labor progress more quickly due to reduced serum catecholamine levels but may also enable the patient to tolerate her contraction discomfort more effectively. The following are examples of mind-body modalities used in labor.

- ***Labor support***. The presence of a supportive individual (for example, a nurse, significant other, family member, friend, or doula) plays a vital role in reducing the use of medications in labor and improves outcomes, including higher rates of vaginal delivery.[13] A doula is a trained professional who provides continuous physical and emotional support to a mother before, during, and shortly after childbirth.[14] Having adequate support to encourage, reassure, and physically assist the patient is associated with reductions in the use of analgesia and anesthesia and with better birth outcomes as indicated by higher Apgar scores and lower cesarean rates.[9] Nurses can positively impact results by actively engaging with the laboring woman, coordinating the woman's support group, providing direct physical contact and communication, or just being a quiet presence.
- ***Relaxation techniques***. Deep or patterned breathing is a common technique used to promote relaxation and decrease the pain of contractions.[11] As pain levels and the

Three stages of labor[33,34]

Labor typically progresses in three stages:

- First stage: from the onset of true labor (regular uterine contractions causing or leading to cervical change) until the cervix is completely dilated at 10 cm. This is the longest stage of labor and is divided into a latent and an active phase.
- Second stage: from full cervical dilation to delivery of the neonate.
- Third stage: from delivery of the neonate to delivery of the placenta and fetal membranes.

In addition, some providers identify a fourth stage, which refers to the first two hours of recovery following delivery of the placenta.

work of labor increase, women intermittently hyperventilate, which may lead to maternal and fetal hypoxemia.[7] Assisting the woman to focus on her breathing not only provides a focal point for her attention but also enables her to maintain adequate oxygenation for herself and the fetus.

Another option that may help a woman relax is having a focal point such as a picture or object to stare at while breathing and working through contractions. Although data are limited, this may help distract a woman from the pain that she is experiencing.

Yoga is a relaxation technique that may help relieve pain by promoting more mindfulness and slow deep breathing. Some women who practice yoga techniques during pregnancy experience less anxiety in labor.[15]

Along the lines of the benefit noted with yoga, music and dance therapy, also called dance labor, can be effective strategies for some women. Music creates a more restful, calm environment, which may reduce pain perception.[16] One randomized controlled study demonstrated the benefits of dance therapy (pelvic tilt and hip maneuvers in unison with back massage) in lowering pain in active labor compared with controls.[17] Dance therapy is a low-risk modality that may increase relaxation and the level of involvement by the woman's support person, and may also hasten labor because the upright positioning works with gravity.

Finally, modifying the physical environment to be more restful with dim lighting, aromatherapy, and battery-operated candles may alleviate some of the anxiety and stress associated with labor. Aromatherapy with essential oils may act as anxiolytic and have positive impact on pain.[11,16,18] Essential oils may be rubbed on the skin, mixed in warm bath water, or diffused in the air with a diffuser.[18] Nurses should be sensitive to the fact that some women have an aversion to the scent, and essential oils can irritate the skin with direct application. Always dilute essential oils with a carrier oil before topical administration and test for irritation by applying a small amount to a small skin area first. In addition, be aware that the fragrance may trigger a reaction in patients with asthma.[16,19]

• ***Hypnotherapy.*** Some women in labor choose to use hypnotherapy (the practice of hypnosis for therapeutic purposes) to help them cope with the discomforts of labor by distracting them or altering their pain perception.[11] Studies have shown that incorporating this method can reduce the use of pain medication in labor.[20] Because it entails no risk to the patient or fetus, it appears a reasonable approach with potential for improved outcomes for those interested in using it.

Some data suggest the use of hypnotherapy is associated with lower rates of operative delivery, decreased need for analgesia and epidurals, and a shorter labor.[15,21] However, women with a history of psychosis or psychopathology are at increased risk of adverse reactions, including exacerbation of their mental health issue, and should avoid this method.[22]

Somatosensory modalities

These nonpharmacologic measures involve direct contact or application techniques. Somatosensory modalities may reduce pain transmission to increase comfort and relaxation.

• ***Physical touch.*** Direct contact through light touch, effleurage (gentle massage in circular or linear fashion), counter-pressure, or massage can provide pain relief throughout labor. These direct contact measures work through the gate theory of pain, which describes how nonpainful stimuli can block painful sensations.[12] Touch and massage provide a different focal point for the woman and reduce muscle tension and fatigue that may occur from the labor process, increasing the woman's sense of control and reducing anxiety.[23] Studies have shown some benefit to incorporating massage as a pain relief measure in labor and to enhance a woman's ability to cope more effectively.[11]

Acupuncture and acupressure are other complementary modalities that may shorten the duration of labor and help manage pain in active labor. Besides pain relief, these modalities are associated with a reduced need for epidural anesthesia compared with no treatment.[24,25]

• ***Heat therapy.*** Cutaneous heat application with warm cloths, disposable heat packs, and rice-filled socks (homemade heating pads that can be warmed in a microwave) may be beneficial in the early stage of labor to relieve some of the musculoskeletal discomfort a woman experiences, including continuing back or hip pain. In the second stage of labor, application of a warm compress to the perineum may be soothing. Use of warm cloths and disposable heat packs have shown some benefit for hastening the labor process, though further studies are needed.[23]

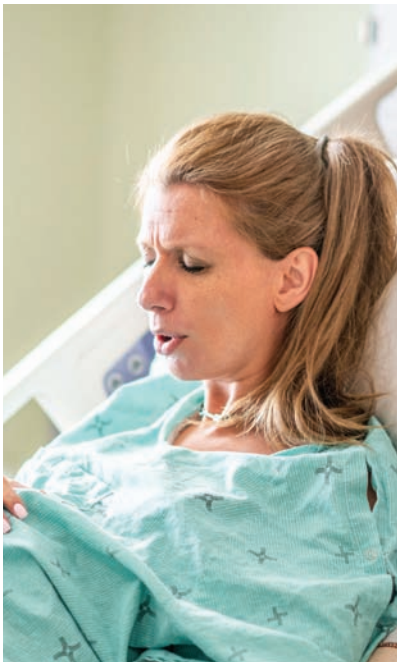
• ***Cold therapy.*** Ice packs or cold packs may have a place in relieving muscle spasms and inflammation in women experiencing back discomfort during labor. Nurses may use an ice-filled glove or frozen gel pack to act as a cold compress. Cold compresses are commonly used after delivery to reduce perineal swelling.[11]

• ***Water therapy (hydrotherapy)***. Water immersion, taking showers, or running water across the abdomen or back can promote relaxation and distort the perception of pain, facilitating the labor process.[11,26] Hydrotherapy has been noted to have a positive impact on maternal pain perception regardless of the type of therapy.[16]

• ***Positioning and movement***. The pelvis is a bowl-shaped bony structure with multiple mobile joints that become more flexible in the third trimester of pregnancy due to increased secretion of the hormone relaxin.[6] This flexibility enables the different pelvic planes and diameters to expand so the fetus can navigate the passageway more easily. Changing positions, whether it be from lying to sitting using a birth ball, peanut ball, or a rocking chair, or switching to an upright or walking position all encourage this process. Changing positions can take pressure off nerves and tissue, alleviating pain and reducing the need for analgesia.[11,15,26]

Movement is also conducive to facilitating the labor process. Upright positions support labor progress better than sedentary positioning.[9]

• ***Sterile water injections***. For women experiencing most of their labor discomfort in the back, injections of sterile water intradermally in four locations over the sacral region of the spine may provide some pain relief and decrease the risk of operative delivery.[9,11] The administration of these injections causes a brief stinging sensation, but as the sensation resolves, back pain eases.[27] Two individuals administering both sets of sterile water injections can minimize the initial discomfort and hasten this method's pain relieving effect.



Changing positions can take pressure off nerves and tissue, alleviating pain and reducing the need for analgesia.

Pharmacologic pain relief measures

A multitude of pharmacologic options are available for labor pain management, although not all are available in every facility. Before initiation of any pharmacologic treatment, nurses must ensure that maternal vital signs are stable, assess the fetus, and confirm that there are no contraindications to administration of the medication. Nurses should remember that all systemic agents can cross the placenta to varying degrees, potentially affecting the fetus.[6]

Most nonopioid drugs such as acetaminophen and diphenhydramine have limited efficacy in active labor.[7] The oral route of administration is generally avoided due to delayed gastric emptying, slow onset of action, and the possibility of nausea and vomiting during labor. The following medications are commonly prescribed.

• ***Nitrous oxide.*** This inhaled blend of gas is typically 50% nitrous oxide and 50% oxygen. Self-administered by the patient via a mask or mouthpiece, it works primarily as an anxiolytic, inducing relaxation and likely reducing pain perception.[28] It is useful at any point in a patient's labor and for perineal repairs and situations such as a retained placenta. Nitrous oxide has a rapid onset of action (1 to 2 minutes) and a very short half-life and has no harmful effects on the fetus.[29]

Nitrous oxide does not seem to negatively impact the course of labor because it does not affect levels of oxytocin, uterine muscle contractions, or fetal well-being, and it does not impact fetal heart rate variability.[28] However, women may experience nausea and temporary sedation, so nurses must ensure safe patient positioning.

• ***Systemic opioids***. Various opioids can be administered by intermittent I.V. bolus doses or by I.V. patient-controlled analgesia. The most commonly used opioids for labor pain management are nalbuphine, meperidine, and morphine.[7] Fentanyl is becoming increasingly common due to its short duration of action and minimal fetal effect.[16] Maternal adverse reactions to these opioids include sedation, nausea and vomiting, and respiratory depression. In addition, opioids cross the placenta and may cause decreased fetal heart rate variability and neonatal respiratory depression if given close to the time of delivery.[7] Opioids often are administered in conjunction with promethazine and hydroxyzine to offset the associated nausea and vomiting and potentiate analgesia.[16]

Nurses need to consider the woman's labor progress and how likely she is to deliver within the duration of

action of the medication before administering an opioid. They should be prepared to support the neonate's respiratory status and have naloxone available as a reversal agent if needed following a precipitous delivery.[28]

• ***Neuraxial analgesia.*** These techniques include epidural and spinal analgesia and combined spinal-epidural analgesia (CSE).[7] As an option for continuous labor anesthesia, epidural anesthesia prevents contraction pain for the duration of labor, making it one of the most requested and frequently chosen pain management options.[15,16] This procedure involves insertion of a catheter in the lumbar epidural space using sterile procedure, followed by administration of a local anesthetic, opioid, or a combination.[16] The anesthesia team should appropriately screen patients for contraindications and be prepared and equipped to provide emergency care if necessary (see *Contraindications for epidural analgesia*).

According to Lim and colleagues, the onset of action for epidural analgesia is usually within 20 minutes, but it takes effect more quickly if administered as CSE.[30] Nurses must monitor patients for adverse reactions such as hypotension due to sympathetic blockade, nausea and vomiting, fever, pruritus, urinary retention, and reduced mobility of the lower extremities.[16] In addition, the fetal heart rate tracing may exhibit a period of late decelerations or bradycardia. As prescribed, manage these adverse reactions with interventions such as a bolus of I.V. fluid and frequent position changes.

Because most women in labor opt for epidural pain management, nurses should be prepared to answer their questions about benefits and risks, including potential adverse reactions. Nurses will also need to assist with patient positioning during catheter placement and assess vital signs when the clinician administers a test dose; a significant increase in systolic BP or heart rate may indicate inadvertent injection into a blood vessel.[31] After catheter placement, frequently conduct pain and dermatome level assessments to ensure proper localized therapy.[6]

There does not appear to be a statistically significant increase in cesarean sections or length of labor associated with epidural anesthesia. Lim and colleagues suggest that if any correlation exists, the explanation may be that many of the women who choose this method of pain relief have risk factors for prolonged labor or cesarean delivery, which is the reason for their heightened pain level.[30]

Spinal anesthesia is usually reserved for cesarean deliveries and not for active labor pain management. Research on its use during labor is limited.[32]

• ***Local anesthetics.*** Local anesthesia with drugs such as lidocaine may provide pain relief during the second stage of labor or, more commonly, for laceration repair after delivery. For pain relief during delivery, it may be given either by direct administration to the perineum or more commonly via a pudendal nerve block.[7,16] This requires a skilled provider to administer the medication into the pudendal nerve plexus to alleviate perineal pain during the delivery.[6] Patients generally do not experience systemic effects with a pudendal block unless the medication is inadvertently administered systemically. It does not provide relief from uterine contractions.[6]

Contraindications for epidural analgesia[16,31,35]

Besides patient refusal, contraindications may include:

- bacteremia (may be acceptable if patient is pretreated with antibiotics and is hemodynamically stable)
- local infection at the puncture site
- known platelet disorder and/or coagulopathy
- therapeutic anticoagulation
- increased intracranial pressure
- thrombocytopenia
- hypovolemia
- significant aortic stenosis
- right-to-left shunt and pulmonary hypertension
- anatomical spine deformities.

Offering education and support

Because nurses often spend hours of one-on-one time with patients in labor and their families, they have the opportunity to build a great sense of rapport with their patients throughout the process. By keeping current about all available pain management options, nurses can offer a patient education and guidance about what might work best based on her stage of labor and her personal labor goals. ■

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