The Use of Lidocaine Spray and Paracervical Nerve Block in Pain Management During Intrauterine Device Insertion: A Literature Review

Rae Plowman, MPAS (Candidate), PA-S, BSc.,
Student Number: 7869161
Email: plowmanr@myumanitoba.ca

Mentor: Dr. Jenna McNaught, MD, FRCSC
Program Director: Rebecca Mueller, MPAS, CCPE, PA-C

A capstone project submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfilment of the requirement for the degree of

MASTER OF PHYSICIAN ASSISTANT STUDIES

Department of Physician Assistant Studies
Max Rady College of Medicine and Faculty of Graduate Studies
University of Manitoba
Winnipeg, Canada
May 15, 2024

TABLE OF CONTENTS

ABSTRACT

Introduction: An intrauterine device (IUD) is an extremely reliable form of contraception with one of the highest satisfaction rates among users. Yet, in Canada the use of IUDs as primary contraception remains low. Women report that pain during IUD insertion dissuades them from selecting this form of contraception. Despite evidence that women experience discomfort during IUD insertions, standard pain control options remain unavailable.

Objective: This literature review aims to evaluate the evidence for lidocaine spray and lidocaine paracervical nerve block in the management of pain during IUD insertion. A second objective is to assess if these techniques are suitable for outpatient visits.

Methods: A search on PubMed was performed with key words and inclusion criteria to obtain articles pertaining to the use of both topical and injected lidocaine as pain management techniques during IUD insertion.

Results: Three studies explored the benefits of lidocaine spray during IUD insertion and two studies assessed the effects of a lidocaine paracervical nerve block. Not only were both topical and injected forms of lidocaine effective in reducing pain during IUD insertion, these techniques were also effective in reducing pain during other procedural steps. Additionally, all participants in the studies tolerated the procedure well on an outpatient basis.

Conclusion: Two effective pain management techniques have been identified in the literature. Lidocaine spray was found to be effective in reducing pain in parous women during multiple steps of IUD insertion. While a paracervical block was effective in reducing pain during IUD insertion in nulliparous women. Further, these interventions were tolerated well and suitable for outpatient clinics.

INTRODUCTION

Worldwide there are 966 million women of reproductive age using contraception (1). There are many methods of contraception available including oral contraceptives, intrauterine devices (IUDs), condoms, implants, and injections. Contraception is broken down into traditional and modern methods (1). Traditional methods include withdrawal or periodic abstinence (1). Modern methods are further categorized into permanent, long-acting reversible, and short-acting (1). Permanent forms involve male or female sterilization (1). Long-acting reversible contraception (LARC), which includes the implant and IUD, can be used for years without daily maintenance (1). Finally, short-acting contraception consists of condoms and other barrier methods, the oral contraceptive pill, patch, vaginal ring and an injection, which all involve more frequent intervention (1).

Contraception is an important part of family planning as it allows people to take control of their reproductive health and decide if or when they want to have children (1). Contraception reduces the number of unintended pregnancies, which account for about 48% of all pregnancies (1). Unintended pregnancies most often result from not using any contraceptive method or using a less effective traditional or short-acting method (1,2). Long-acting reversible methods of contraception provide the best protection from unplanned pregnancy (3).

Intrauterine Device (IUD)

Intrauterine devices (IUDs) are used by nearly 161 million women worldwide (1). IUDs are a very effective long-term, reversible and less adherence-demanding method of contraception (4). Because they do not depend on daily action, they have a very low typical use failure rate of 0.2% (4,5). IUDs prevent fertilization by adversely affecting sperm motility and

changing the viscosity of cervical mucous (4). In Canada, there are two types of IUDs available: copper-containing or levonorgestrel-releasing, giving people the choice between a non-hormonal or hormonal option (4). In addition to reducing the number of unplanned pregnancies, non-contraceptive benefits of levonorgestrel-releasing IUDs include reducing menstrual flow and dysmenorrhea (4). Both types of IUDs also reduce the risk of endometrial cancer (4).

Women who choose IUDs as a method of contraception report being drawn to the convenience, efficacy, option for non-hormonal contraception (copper IUD) and the non-contraceptive benefits (6,7). Many women want the most effective contraception option, which leads them to choose a long-acting reversible method (6). There is a high continuation rate with IUDs; about 83% of women who choose an IUD are still using it one year later (7). Similarly, women who were initially seeking short-acting contraception but decided to try an IUD reported higher continuation rates and higher satisfaction compared to those using a short acting contraceptive (3). Satisfaction with contraceptive method is highest in IUD users compared to the implant and oral contraceptive (7).

Barriers and Pain Management

Although it is one of the most effective forms of birth control with high satisfaction rates, the use of IUDs as a primary form of contraception in Canada remains low (8). There may be several factors contributing to this, including lack of knowledge, concern about pain during insertion, and accessibility barriers (3,8,9). One study found that 79% of women on college campuses lacked general knowledge about IUDs including the mechanism of action, effectiveness, and possible side effects (9). Additionally, there are many misconceptions about health risks and efficacy that may negatively influence women's attitudes and desire to choose

an IUD (4,9,10). Cost can be another barrier to accessing IUDs; some women in Canada may need to pay upfront for an IUD if not covered by insurance, although this will be changing with universal contraception coverage (5,10).

Concern about pain during IUD insertions has been reported in the literature as a common reason for never trying an IUD (3,9,11). It is true that many women may experience pain or cramping of variable severity with IUD insertion (4). Pain is likely a physiological response to an IUD passing through the cervix and its presence in the uterus (4). Anticipated pain prior to IUD insertion is generally rated as moderate, and varies based on ethnicity, prior vaginal delivery, and sexual activity (11,12). Having a high anticipated pain prior to a procedure can increase anxiety and lead to increased perceived pain levels (12). One study found that high anxiety scores prior to a cervical biopsy were associated with higher perceived pain scores during the procedure (13). Hunter et al found that individuals anticipating high levels of pain have significantly higher pain scores after IUD insertion (12). If participants had low anticipated pain scores their perceived pain during IUD insertion was also lower (12). Pain experiences can differ based on an individual's parity; one study found that parous women rated their expected pain as higher than their actual pain experienced during IUD insertion (11). In nulliparous women, their expected pain, which they rated a 7 out of 10, was equivalent to the pain experienced during IUD insertion (11). Not only can anticipated pain increase perceived pain, but those without a history of vaginal delivery are at an increased risk of pain during IUD insertion (11,12).

Furthermore, it was found that healthcare providers tend to underestimate the pain experienced by patients during IUD insertions (14). This provides a unique challenge, because

if pain is not recognized by healthcare providers, they may be less likely to offer pain management and may be less aware of the discomfort a procedure causes.

To alleviate pain during IUD insertion different oral medications have been trialled. Ibuprofen at both a low and high dose about 30-45 minutes prior to IUD insertion was found to be ineffective in reducing pain (15,16). Pre-procedural misoprostol, a cervical ripening agent, was also found to be unsuccessful in mitigating pain when used buccally and vaginally (17,18). Lidocaine has also been evaluated as a topical or injected local anesthetic. McNicholas et al studied the efficacy of a 2% lidocaine gel applied to the tenaculum site and endocervical canal, however findings were not significant for pain relief during IUD insertion (19). Further, self-administered 2% lidocaine gel reduced pain during tenaculum placement, but did not reduce pain during IUD insertion (20). EMLA (lidocaine/prilocaine) cream when applied to the cervix was effective in reducing pain during tenaculum placement, uterine sounding and IUD insertion (21).

For other gynecological procedures lidocaine spray and paracervical nerve block have been shown to be effective in providing pain relief (13,22–24). One study found that 40mg of 10% lidocaine spray prior to endometrial biopsy offered a significant reduction in pain (22). This finding is inconsistent with more recent research by Piyawetchakarn et al, which used 80mg of 10% lidocaine spray prior to endometrial aspiration biopsy and was found to be unsuccessful in pain reduction (23). During colposcopy-directed cervical biopsies, lidocaine spray was found to produce a small reduction in perceived pain (13). Another modality for local anesthetic is a paracervical block. Renner et al demonstrated the analgesic effects of a 1% buffered lidocaine block during an induced abortion procedure (24). Overall, both oral medication and local anesthetic have been studied for their effects on pain management during

IUD insertions and other gynecological procedures, but these results have been inconsistent. This justifies further research to determine effective pain management strategies for IUD insertion.

Purpose of this Literature Review

Women have identified that they experience pain with IUD insertions which may or may not be appreciated by their healthcare provider (11,14). Additionally, fear of pain during IUD insertion is a barrier to accessing this extremely reliable form of contraception (3,9). Various analgesic and local anesthetic techniques have been trialled but results have been inconsistent. At present, there is no standard for pain relief during IUD insertions. The purpose of this literature review is to assess the evidence for topical and injected lidocaine in pain management for women during IUD insertion. Further, this literature review aims to explore the practicality of implementing this practice in an outpatient setting to improve accessibility.

METHODS

A PubMed search was conducted between November 2023 to January 2024 to find articles pertaining to the use of lidocaine during IUD insertions. Worldwide randomized controlled trials, in the English language, were included between the years of 2010 to present (January 2024). Key words used for search criteria were lidocaine, lidocaine block, lidocaine spray, intrauterine device (IUD) and pain. Articles using lidocaine spray or injected paracervical lidocaine for the purpose of investigating the pain reducing effects during intrauterine device insertion were selected. Inclusion criteria included free access to full text of the articles, study design of randomized control trial or placebo-controlled trial. Articles were excluded if lidocaine

was used in a form other than a spray or paracervical block (such as gel, cream, infusion), if the procedure was not IUD insertion, if the objective of the study was to investigate anticipated pain or satisfaction with IUD, or if the intervention group was being compared to a group that only received oral analgesics.

Results

A comprehensive search on PubMed yielded five articles that met the above criteria, and investigated the use of lidocaine as pain management for IUD insertion. Three studies looked at the efficacy of lidocaine spray in minimizing pain during IUD insertion, while two studies used a paracervical nerve block as a pain management technique. Each study utilized the visual analogue scale to quantify pain levels. A visual analogue scale (VAS) is normally a 10cm horizontal line with verbal cues at either end depicting “no pain” or “worst pain” (25). An individual will then place a mark on the line that corresponds with their pain intensity (25). A summary of the five articles including study design, population, intervention, conclusions, and limitations can be found in Table 1 in the appendix.

Lidocaine Spray Prior to Intrauterine Device Insertion

One of the first demonstrations of the use of lidocaine spray for pain control during IUD insertions was done by Aksoy et al in 2015 (26). Participants were parous women who had a history of vaginal delivery and were between the ages of 19-49 (26). Using a double-blind, placebo-control trial performed in a clinic, participants either received 4 puffs of 10% lidocaine spray or 4 puffs of normal saline (26). Participants were asked to rate their pain on a 10-cm VAS scale at two time points; first was immediately before speculum placement and second was

immediately following IUD insertion (26). It was found that there was a significantly lower procedure pain score in the treatment group compared to the control group (26). The average pain score for those in the treatment group was 1 (range of 0-6) and the average for the control group was 3 (range 0-7) (26). Further, the control group had more frequent ratings of 4 and above on VAS scale (26). There was no time difference for procedure length between the two groups and no systemic side effects of lidocaine were observed (26). This study concluded that lidocaine 10% spray was effective in reducing pain during IUD insertion (26).

A following study by Hajiesmaello et al was done to evaluate the analgesic effects of lidocaine spray during copper IUD insertion (27). This randomized control trial involved parous women (vaginal delivery or caesarean section) between the ages of 18 and 45 (27). Similarly to Aksoy's study, participants in the intervention group received 4 puffs of 10% lidocaine spray (27). The control group underwent IUD insertion with no analgesia or placebo (27). Pain was recorded at five different time points using a VAS: baseline, tenaculum placement, uterine sounding, IUD insertion and 15 minutes post procedure (27). In both groups, the most painful phase was tenaculum placement (27). The intervention group had significantly lower VAS scores after tenaculum placement, uterine sounding, and IUD insertion ($p < 0.001$) (27). This study found that lidocaine spray prior to IUD insertion reduced pain scores at all phases of the procedure (27). This study concluded that lidocaine reduced pain at many procedural steps of IUD insertion and remained significant 15 minutes post procedure (27).

The most recent study by Panichyawat et al in 2021 was a randomized, double blind, placebo-controlled trial to evaluate the effectiveness of lidocaine spray for reducing pain immediately following IUD insertion (28). Participants were mostly parous women between the ages of 18-45 (28). Treatment groups received 4 puffs of 10% lidocaine spray and the placebo

group received 4 puffs of sterile water spray (28). The VAS was taken at 6 points during the procedure; immediately following speculum insertion, tenaculum insertion, uterine sounding, IUD insertion, and 5 and 20 minutes following the procedure (28). The lidocaine group had significantly lower pain scores after IUD insertion, tenaculum placement and uterine sounding (28). The highest average pain score was found to be during IUD placement in both groups (28). More women in the placebo group had a VAS score of greater to or equal to 4 (28). VAS score changes from baseline throughout the procedure were also lower in the lidocaine group (28). Some women that received lidocaine reported vaginal irritation as a side effect (28). This study concluded that those that received 10% lidocaine spray reported significantly less pain compared to the placebo group (28).

Lidocaine Paracervical Nerve Block Prior to Intrauterine Device Insertion

Akers et al demonstrated the effectiveness of a lidocaine paracervical nerve block in young women who underwent insertion of a 13.5mg levonorgestrel IUD (29). The study was a randomized, single-blind, placebo-controlled trial conducted in a clinic setting. Participants were nulliparous between the ages of 14-22 (29). The treatment group received 1ml of 1% lidocaine injection at the tenaculum site and 4.5ml at the 4 and 8 o'clock positions at the cervicovaginal junction (29). In the placebo group, pressure was applied to the same three sites using the wooden end of a cotton tip applicator to depress the vaginal epithelium 1cm (29). Pain was measured at seven points during the procedure with the VAS; baseline, after speculum, tenaculum, cervical block, uterine sounding, IUD insertion and 5 minutes following speculum removal (29). Average VAS scores were significantly lower in the lidocaine block group compared to the sham block group (30.0 vs 70.1; $p<0.001$) after IUD insertion (29). VAS scores

continued to be lower in all procedural steps starting with tenaculum placement in the lidocaine block group except for the “block” placement, at which time there was no significant difference in VAS (29). Within group comparisons of the lidocaine block group revealed that the speculum insertion and IUD insertion increased average pain scores, but this did not stay significant at 5 minutes post procedure (29). Within group comparisons for the sham block group showed increased pain for all procedural steps except tenaculum placement when compared with the sham block (29). Additionally, anticipated pain was positively related to pain during IUD insertion, but this did not differ between groups (29). Interestingly, there was no difference in satisfaction with IUD insertion between the two groups (83% vs 71%, P=0.16) (29). It was concluded that a paracervical block was effective for pain control during IUD insertion for nulliparous adolescent women (29).

Another randomized, single-blind, placebo-controlled trial by Mody et al sought to determine if a buffered lidocaine solution would provide pain relief with IUD insertion (30). Buffering the lidocaine with sodium bicarbonate is meant to reduce the burning sensation associated with lidocaine administration (30). Included in this study were nulliparous women between the ages of 18-45 years old (30). The intervention group received a paracervical block of 18cc of 1% lidocaine buffered with 2cc of 8.4% sodium bicarbonate (30). The solution was injected into the 12, 4 and 8 o’clock positions of the cervix (30). The placebo group received the same 2cc of buffered lidocaine to the 12 o’clock position (tenaculum site), but had a capped needle touch the 4 and 8 o’clock positions (30). Pain was measured using the VAS at baseline, speculum insertion, sham/paracervical block administration, tenaculum placement, uterine sounding, IUD placement, 5 minutes post procedure and overall pain (30). The paracervical block group had lower median VAS scores during IUD insertion, uterine sounding, and 5

minutes post IUD insertion (30). Overall pain perception of the procedure was lower in the paracervical block group (30). Pain during block administration was higher in the intervention group compared to the sham block group (30). There was no difference between the groups for pain during baseline, anticipated pain, speculum insertion or tenaculum placement (30). Participants who did not receive a lidocaine block were more likely to report that IUD insertion pain was worse than expected (30). While those who received a lidocaine block were more likely to report no pain with the procedure or pain was not as bad as expected (30). Locally administered lidocaine was found to be effective pain control for nulliparous women for a variety of IUD types; in this study, the majority of women received the larger 52mg levonorgestrel IUS or the Copper T380 (30).

DISCUSSION

A literature review was done to examine evidence for the use of topical and injected lidocaine in pain management for intrauterine device insertion. Pain and anticipated pain during an IUD insertion has become a barrier that deters women from choosing this extremely reliable form of contraception (3,9). Fortunately, women who had an IUD insertion with analgesic report less pain during the procedure than those who did not receive any analgesics (26–30). Another objective of this literature review was to explore the ability to utilize this practice in an outpatient setting by investigating the environment each study was conducted in.

Lidocaine Spray for Pain Management During Intrauterine Device Insertion

All three studies demonstrated the ability of 10% lidocaine spray (40mg) to the cervix prior to IUD insertion to be effective in reducing pain. Further, the most recent of these two

studies showed it is effective at reducing pain during other procedural steps including uterine sounding and tenaculum placement, which along with IUD insertion, tend to be the most painful parts of the procedure (26–28). Analgesic effects of lidocaine continued to be significant 15 minutes post procedure (27). Topical lidocaine also reduced severity of pain, on average there was a smaller change in pain scores from baseline to IUD insertion (28). Similarly, those that received lidocaine had a lower frequency of moderate to severe pain ratings during IUD insertion and uterine sounding (26,28). Not only was lidocaine spray effective in reducing pain during the procedure, but it also reduced the severity of pain and reduced post-procedure pain (26–28).

Each study varied in the percentage of nulliparous versus multiparous women included. Panichyawat et al mostly included parous women with a history of vaginal delivery; only 6 of the 124 participants were nulliparous (28). Aksoy et al only included women with a history of vaginal delivery, while Haijesmaello et al included parous women with a history of either vaginal or caesarean deliveries (26) (27). Women with only a history of caesarean section may be viewed as nulliparous in the context of an IUD insertion (27). This is important since previous research has reported that nulliparity is a predictor for increased pain during IUD insertion (14). Parous women have been found to report their pain during IUD insertion as mild (11). With mostly parous women involved in studies examining the effects of lidocaine spray, and the understanding that parous women's pain is generally milder, it may be deduced that lidocaine spray alleviates mild pain associated with IUD insertion.

Although each study was done in different parts of the world it appears that each procedure was done on an outpatient setting, either a clinic, hospital or research center (26–28). There were no post-procedural side effects that required any participants to be hospitalized, some vaginal irritation was reported but no systemic side effects (28). A few participants were recorded to have

experienced mild vasovagal reactions involving nausea, vomiting and dizziness but did not require any treatment (26). Overall, the procedure was tolerated well and can be inferred that the use of lidocaine spray in a clinic or outpatient setting is appropriate.

Paracervical Block for Pain Management During Intrauterine Device Insertion

Two studies examined the pain management effects of a lidocaine paracervical nerve block during IUD insertion (29,30). Both studies injected lidocaine solution into the tenaculum site and at the 4 and 8 o'clock positions of the vaginal fornices, only differing in volume injected and type of lidocaine solution (29,30). The first study published in 2017 demonstrated reduced pain during IUD insertion in those that received a 10cc 1% lidocaine paracervical block (29). Additionally, it reduced pain over multiple procedural steps and continued to be effective 5 minutes post procedure (29). Similar research with a 20cc buffered lidocaine solution (18cc 1% lidocaine and 2cc 8.4% sodium bicarbonate) showed lower average pain scores after IUD insertion, uterine sounding, 5 minutes post procedure and overall pain perception (30). Interestingly, the 10cc lidocaine block group had significantly lower scores after tenaculum placement which was before the block was administered (29). It might be presumed that both groups would have similar pain scores at this step as the intervention had not been initiated yet. Mody et al, administered the block prior to tenaculum placement, but there was no difference in pain scores after tenaculum placement in either group (30). Akers et al demonstrated no difference in pain scores during block administration between each intervention group illustrating that the injection did not increase pain perception (29). This is inconsistent with the findings by Mody et al which found block administration to be more painful in the lidocaine group (30). This may be a result of a higher volume being delivered to the cervix or sodium

bicarbonate being an inefficient buffer at this anatomical site. Both studies only included nulliparous women of various ages, making their findings only significant for this population (29,30). It can be concluded that a paracervical nerve block prior to IUD insertion in nulliparous women is effective in reducing pain experiences, however this method itself may be painful to administer (29,30).

Overall, the paracervical nerve block was tolerated by participants in both studies (29,30). No severe adverse reactions occurred with the paracervical block, some participants in both the intervention and sham-block group reported mild side effects (29,30). Side effects included nausea, dizziness and pain at injection site (30). No further interventions were required for these side effects, making this pain control method a suitable option for outpatient visits.

Future Directions

Although the research thus far is promising for finding a suitable option for pain relief during IUD insertions, there is still room for future research. Pain during IUD insertions differs between nulliparous and parous women. It has been found that during IUD insertion, or other gynecological procedures, nulliparous women experience higher levels of pain (13,14,19). The two studies reviewed concluded that paracervical nerve blocks are effective at reducing pain during IUD insertion in nulliparous women (29,30). However, there are more risks associated with a paracervical nerve block including bleeding, hematoma, infection and pain during injection (30,31). A more serious, but rare complication can occur if lidocaine is injected intravascularly and can cause seizures, hypotension or ventricular arrythmias (31). When comparing to the side effects of lidocaine spray, generally mild irritation at the application site may be reported (27,28). Topical analgesia is less invasive and application is not painful.

Therefore, there is a compelling need to investigate the efficacy of lidocaine spray in nulliparous women. Not only would this introduce a non-invasive option, it also allows women to have a choice and make a decision for which analgesic they are most comfortable with.

CONCLUSION

An intrauterine device (IUD) is an extremely reliable form of contraception, yet many individuals are apprehensive to trying one due to the fear of pain during the procedure (4,9,10). Currently there are no standard pain control methods for IUD insertion. The main objective of this literature review was to assess the evidence for topical and injected lidocaine as pain relief in women undergoing an IUD insertion. It was found that lidocaine spray was not only effective in reducing pain during IUD insertion in parous women, but reduced severity of pain and reduced pain at multiple procedural steps (26–28). Research on paracervical blocks during IUD insertion had similar findings. In nulliparous women it was found that a paracervical block was able to reduce pain at multiple procedural steps during IUD insertion, however the block itself can be painful (29,30). These research findings offer promising insights into the development of diverse pain management strategies for IUD insertion. Having options available to provide pain relief may reduce anxiety and anticipated pain associated with the procedure which has been found to increase perceived pain levels (12). By introducing pain control options for women during IUD insertion, it may encourage more women to consider this highly effective form of contraception. Not only will this make IUDs more accessible but it will increase women's comfort level with the procedure if they are routinely offered pain control.

REFERENCES

1. United Nations Department of Economic and Social Affairs PD (2022). World Family Planning 2022: Meeting the changing needs for family planning: Contraceptive use by age and method.
2. Bellizzi S, Mannava P, Nagai M, Sobel HL. Reasons for discontinuation of contraception among women with a current unintended pregnancy in 36 low and middle-income countries. Contraception. 2019 Oct 23;101(1):26–33.
3. Hubacher D, Spector H, Monteith C, Chen PL. Not seeking yet trying long-acting reversible contraception: a 24-month randomized trial on continuation, unintended pregnancy and satisfaction. Contraception. 2018 Jun 1;97(6):524–32.
4. Black A, Guilbert E, Costescu D, Dunn S, Fisher W, Kives S, et al. Canadian Contraception Consensus (Part 3 of 4): Chapter 7 - Intrauterine Contraception. Journal of Obstetrics and Gynaecology Canada. 2016;38(2):182–222.
5. Health Canada. Universal Access to Contraception. 2024.
6. Wiebe ER, Trouton KJ, Dicus J. Motivation and Experience of Nulliparous Women Using Intrauterine Contraceptive Devices. Vol. 32, J Obstet Gynaecol Can. 2010.
7. Peipert JF, Zhao Q, Allsworth JE, Petrosky E, Madden T, Eisenberg D, et al. Continuation and satisfaction of reversible contraception. Obstetrics and Gynecology. 2011 May;117(5):1105–13.
8. Black A, Yang Q, Wen SW, Lalonde AB, Guilbert E, Fisher W. Contraceptive Use Among Canadian Women of Reproductive Age: Results of a National Survey. Journal of Obstetrics and Gynaecology Canada. 2009;31(7):627–40.
9. Hall KS, Ela E, Zochowski MK, Caldwell A, Moniz M, McAndrew L, et al. “I don’t know enough to feel comfortable using them:” Women’s knowledge of and perceived barriers to long-acting reversible contraceptives on a college campus. Contraception. 2016 Jun 1;93(6):556–64.
10. Hauck B, Costescu D. Barriers and Misperceptions Limiting Widespread Use of Intrauterine Contraception Among Canadian Women. Journal of Obstetrics and Gynaecology Canada. 2015;37(7):606–16.
11. Brima N, Akintomide H, Iguyovwe V, Mann S. A comparison of the expected and actual pain experienced by women during insertion of an intrauterine contraceptive device. Open Access J Contracept. 2015 Feb;21.
12. Hunter TA, Sonalkar S, Schreiber CA, Perriera LK, Sammel MD, Akers AY. Anticipated Pain During Intrauterine Device Insertion. J Pediatr Adolesc Gynecol. 2020 Feb 1;33(1):27–32.
13. Mongkolmafai O, Jeerakornpassawat D, Tantipalakorn C, Charoenkwan K, Suprasert P, Srisomboon J, et al. Efficacy of Lidocaine Spray for Pain Reduction during Colposcopy-Directed Cervical Biopsies: A Randomized Controlled Trial. Medicina (Lithuania). 2024 Apr 1;60(4).
14. Akintomide H, Brima N, Sewell RDE, Stephenson JM. Patients’ experiences and providers’ observations on pain during Intrauterine device insertion.
15. Hubacher D, Reyes V, Lillo S, Zepeda A, Chen PL, Croxatto H. Pain from copper intrauterine device insertion: Randomized trial of prophylactic ibuprofen. Am J Obstet Gynecol. 2006 Nov;195(5):1272–7.

16. Bednarek PH, Creinin MD, Reeves MF, Cwiak C, Espey E, Jensen JT. Prophylactic ibuprofen does not improve pain with IUD insertion: A randomized trial. Contraception. 2015 Mar 1;91(3):193–7.
17. Espey E, Singh RH, Leeman L, Ogburn T, Fowler K, Greene H. Misoprostol for intrauterine device insertion in nulliparous women: A randomized controlled trial. Am J Obstet Gynecol. 2014;210(3):208.e1-208.e5.
18. Lotke P, Tiwari A, Nuno V. Inserting intrauterine devices in nulliparous women: is misoprostol beneficial? A registered clinical trial. Am J Clin Exp Obstet Gynecol. 2013;1(1):62–8.
19. McNicholas CP, Madden T, Zhao Q, Secura G, Allsworth JE, Peipert JF. Cervical lidocaine for IUD insertional pain: A randomized controlled trial. Am J Obstet Gynecol. 2012;207(5):384.e1-384.e6.
20. Rapkin RB, Achilles SL, Schwarz EB, Meyn L, Cremer M, Boraas CM, et al. Self-Administered Lidocaine Gel for Intrauterine Device Insertion in Nulliparous Women: A Randomized Controlled Trial. In: Obstetrics and Gynecology. Lippincott Williams and Wilkins; 2016. p. 621–8.
21. Tavakolian S, Doulabi MA hmadi, Baghban AA kbarzade, Mortazavi A, Ghorbani M. Lidocaine-Prilocaine Cream as Analgesia for IUD Insertion: A Prospective, Randomized, Controlled, Triple Blinded Study. Glob J Health Sci. 2015;7(4):399–404.
22. Aksoy H, Aksoy U, Ozyurt S, Acmaz G, Babayigit MA, Yücel B, et al. Effect of lidocaine spray in pain management during office-based endometrial sampling: A randomised placebo-controlled trial. J Obstet Gynaecol (Lahore). 2016 Feb 17;36(2):246–50.
23. Piyawetchakarn R, Charoenkwan K. Effects of lidocaine spray for reducing pain during endometrial aspiration biopsy: A randomized controlled trial. Journal of Obstetrics and Gynaecology Research. 2019 May 1;45(5):987–93.
24. Renner RM, Nichols MD, Jensen JT, Li H, Edelman AB. Paracervical block for pain control in first-trimester surgical abortion: A randomized controlled trial. Obstetrics and Gynecology. 2012 May;119(5):1030–7.
25. Lazaridou A, Elbaridi N, Edwards RR, Berde CB. Pain Assessment. In: Benzon H, Raja S, Liu S, Fishman S, Cohen S, editors. Essentials of Pain Medicine. Fourth Edition. Elsevier; 2018. p. 39–46.
26. Aksoy H, Aksoy Ü, Ozyurt S, Açmaz G, Babayigit M. Lidocaine 10% spray to the cervix reduces pain during intrauterine device insertion: a double-blind randomised controlled trial. Available from: http://dx.doi.org/10.1136/jfprhc-
27. Hajiesmaello M, Mohammadi E, Farrokh-Eslamlou H. Evaluation of the effect of 10% lidocaine spray on reducing the pain of intrauterine device insertion: A randomised controlled trial. S Afr J Obstet Gynaecol. 2019;25(1):25–9.
28. Panichyawat N, Mongkornthong T, Wongwananuruk T, Sirimai K. 10% lidocaine spray for pain control during intrauterine device insertion: A randomised, double-blind, placebo-controlled trial. BMJ Sex Reprod Health. 2021 Jul 1;47(3):159–65.
29. Akers AY, Steinway C, Sonalkar S, Perriera LK, Schreiber C, Harding J, et al. Reducing pain during intrauterine device insertion: A randomized controlled trial in adolescents and young women. In: Obstetrics and Gynecology. Lippincott Williams and Wilkins; 2017. p. 795–802.

30. Mody SK, Farala JP, Jimenez B, Nishikawa M, Ngo LL. Paracervical block for intrauterine device placement among nulliparous women: A randomized controlled trial. Obstetrics and Gynecology. 2018;132(3):575–82.
31. Vidaeff A. UpToDate. 2023. Pudendal and paracervical block.

APPENDIX

Table 1: Summary of the five articles used in this literature review, including the study design and details, population and sample size, intervention, outcomes and conclusions and limitations.

Study	Study Design and Details	Study Population and Sample Size	Intervention	Outcomes and Conclusions	Limitations
Aksoy et al, 2015 (26)	Type: randomized, double blind, placebo-controlled trial Location: Kayseri, Turkey	Population: parous women (vaginal delivery) between the ages of 19-49. Sample size: 200 (100 in each group)	IUD type: Copper-T380A Treatment group: 4 (10mg/ml/puff) pumps of 10% lidocaine spray Placebo group: 4 pumps of isotonic saline solution spray Pain scale: 10cm VAS	Treatment group participants had an overall lower pain score compared to the placebo group. When compared to a placebo, lidocaine was demonstrated to reduce IUD insertion pain.	No nulliparous women involved. Pain was only measured at two time points (before speculum placement and following insertion) No control group without lidocaine or placebo
Hajiesmaello et al, 2019 (27)	Type: randomized control trial Location: Urmia, Iran	Population: parous women (vaginal and caesarean section deliveries) between the ages of 19-45. Sample size: 80 (40 in each group)	IUD type: Copper-T380A Treatment group: 4 puffs (10mg/puff) 10% lidocaine Control group: IUD inserted without local anesthetics Pain scale: 10cm VAS	Treatment group had lower pain scores during tenaculum placement, hysterometer insertion, IUD insertion and 15 minutes post procedure compared to control group.	No nulliparous women involved, caesarean section only women were viewed as nulliparous for the purpose of IUD insertion. Participants were not blinded from their intervention group. No placebo group
Panichyawat at al, 2021 (28)	Type: randomized, double blind, placebo-controlled trial Location: Bangkok, Thailand	Population: women ages 18-45 (parous and nulliparous) Sample size: 124 (62 in each group)	IUD type: Copper-T380A Treatment group: 4 puffs of 10% lidocaine spray (10mg/ml/puff) Placebo group: 4 puffs of sterile water spray	Women in the treatment group reported significantly less pain during tenaculum placement, uterine sounding, and immediately after IUD placement.	Minimal nulliparous women involved (6 total).

			Pain scale: 10cm VAS		
Akers et al, 2017 (29)	Type: randomized, single blind, placebo-controlled trial Location: Philadelphia, USA	Population: nulliparous women aged 14-22 Sample size: 95 (47 in treatment group and 48 to placebo)	IUD type: 13.5 levonorgestrel (Skyla) Treatment group: 1mL 1% lidocaine at tenaculum site and 4.5mL at 4 and 8 o'clock positions at the cervicovaginal junction Placebo group: pressure applied to same three sites with unbroken, wood end of cotton tipped applicator to depress vaginal epithelium 1mL Pain scale: 100mm VAS	Pain score immediately after IUD insertion was lower in treatment group. Placebo group has higher pain scores during tenaculum placement and remained higher during subsequent steps.	Participants received 800mg ibuprofen 20 minutes prior to the procedure Research staff who collected data from participants were not blinded to the study Sample size included mostly white, educated, insured young adults. No parous women were included
Mody et al, 2018 (30)	Type: randomized, single blind, placebo-controlled trial Location: San Diego, USA	Population: nulliparous women aged 18-45 Sample size: 64 (33 in treatment group, 31 in control group)	IUD type: LNG-52mg (Mirena), CuT380A, LNG-13.5mg (Skyla) Treatment group: 20cc paracervical block consisting of 18cc of 1% lidocaine buffered with 2cc 8.4% sodium bicarbonate. 2cc injected to the tenaculum site, 18cc injected to the vaginal fornices at 4 and 8 o'clock positions Placebo group: 2cc of buffered lidocaine to the tenaculum site. A capped needle to the 4 and 8 o'clock positions Pain scale: 100mm VAS	Treatment group had lower median pain scores for IUD placement, uterine sounding, 5 minutes post procedure and overall pain perception for the procedure. Pain with paracervical block was higher in the treatment group.	Lack of diversity in age, race and education level which limits generalizability of results Increased complexity of adding sodium bicarbonate No parous women were included