How Can Family Nurse Practitioners Reduce Barriers to Intrauterine Devices Among Canadian Women?

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Abstract

Canada continues to struggle with high rates of unplanned pregnancies resulting in significant health, financial, and social implications. The best strategy in preventing unplanned pregnancies is with regular use of reliable and safe contraception. In Canada, most women rely on oral hormones and male condoms as their primary means of contraception, despite their reduced efficacy. IUDs, on the other hand, are a highly reliable, safe and reversible form of contraception, yet many Canadian women do not use them.

A thorough literature review found that many factors act as barriers to IUD use in Canada, which were found to be impeding IUD use in Canada. Three categories of barriers to IUD use were identified: those associated with the IUD user, those associated with the healthcare provider, and those associated with the healthcare system. In response to these barriers, I have targeted a collection of strategies that could be implemented to help reduce them to assure reliable accessibility to IUDs in Canada.

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Chapter 1: Introduction and Background

Canada is a nation with disproportionately high rates of unplanned pregnancies, most arising from ineffective contraception or contraception failure (Black et al., 2015). Unplanned pregnancies are especially prominent among vulnerable women including youth, First Nations, immigrant and poor populations (Aptekman, Rashid, Wright & Dunn, 2014; Weibe, 2013; Black et al., 2015). This disproportionate representation of unplanned pregnancies among vulnerable Canadians is a financial, healthcare, and social justice issue. With an annual estimate of 180,000 unplanned pregnancies, Canada spends an additional 140 million dollars on deliveries and abortions (Black et al., 2015). Moreover, health complications for the fetus and the mother are more likely with unintended pregnancies. As a society that prides itself on public, comprehensive, universal, portable and accessible healthcare (Canada Health Act, 1984), reliable contraception must remain available to all women. To rectify this financial, health, and social justice issue, Canada could benefit from increased rates of reliable contraception such as Intrauterine Devices (IUDs). IUDs are readily used in many other countries, however, in Canada they make up less than 1% of all contraception methods. This literature review looks at the barriers Canadian women face obtaining IUDs and subsequently makes recommendations for strategies to remove these barriers.

The Importance of Contraception

The International Survey of Married and Unmarried women found that 57% of all fertile women want to avoid pregnancy (Darroch & Singh, 2013). Despite this, only half of these women use reliable modern contraception (United Nations, 2011). The remaining 44% either depend on unreliable methods or they use none, making them a very high risk for unplanned pregnancies. This discrepancy between the desire to avoid pregnancy and taking appropriate

action to do so is a gap between knowledge, attitudes, and practices (KAP). This concept was initially explored in the 70's by Bogue (1974), coining it as the KAP-gap. Bogue (1974) found five key reasons that women may not take appropriate action to prevent pregnancies: undesired side effects of contraction, a fear of modern contraception, misinformation about contraception from providers, mistrust towards the healthcare system, and disappointments from previous contraception experiences. Other important factors that contribute to the KAP-gap include institutional and systemic barriers such as a lack of accessibility and availability.

The World Health Organization (WHO) describes contraception as a basic human right by which a woman can control her fertility (Cottingham & Ravindram, 2015). WHO has outlined nine parameters necessary for providing this human right. Contraception must be

- provided without discrimination,
- available in sufficient quantity,
- accessible both physically and economically,
- provided with acceptable information and services,
- high quality (including the contraception, the counseling, and the services),
- included with information for decision making,
- provided with privacy and confidentiality,
- in participation with the woman selecting it.

Nations should be held accountable for upholding the above principles. By meeting these nine parameters, we should be able to reach a state where all women who want to avoid pregnancy can. Until we achieve this, the KAP-gap will persist, and many women will remain at risk of unplanned pregnancies.

Unplanned Pregnancies

Unplanned pregnancies are difficult to quantify. The variables can be difficult to define, and the methods of measurement are often biased. Gipson, Koenig, and Hindin (2008) discussed this challenge in their systematic review, which sought to quantify the effects of unplanned pregnancies. They found that the definition of unplanned pregnancies varies among studies; some classified a pregnancy into a dichotomy of wanted or unwanted, while others included a third term: mistimed. Gipson et al. (2008) also found many biases associated with the data collection process. They found pregnancy intentionality could change as time elapsed, and if the circumstances for raising a child changed. Gipson et al. (2008) also found that many of these studies rely on cross-sectional, retrospective reports, which were fraught with recall bias.

Objective measurements, such as abortion rates, can be used to estimate the rate of unplanned pregnancies. Finer and Henshaw (2006) found that only 5% of all medically terminated pregnancies are intended at conception, so this could be used as an indicator for unintended pregnancies. In Canada, more than 81 000 abortions were performed in 2014, and 100 000 in 2015 (Canadian Institute for Health Information (CIHI), 2016). Since 95% of medical abortions occur from unplanned pregnancies (Finer & Henshaw, 2006), this surge in abortions suggests that unplanned pregnancies may also be on the rise. Abortion rates alone, however, underestimate unplanned pregnancies, as many women may choose not to terminate them.

Even though there is no reliable or consistent method to measure unplanned pregnancies, many experts have collaborated to make these estimations. Using birth data, abortion rates, surveys, and expert opinions, Black et al. (2015) estimated that up to 40% of all pregnancies in Canada are unplanned. This Canadian approximation is similar to a North American estimate of 48% (Singh, Sedgh, & Hussain, 2010), and an American estimate of 45% (Finer & Zolna, 2016).

Regardless of how we assess the intentionality of pregnancies in Canada, almost half are unplanned. This remains an issue that must be addressed as it has considerable effects on mothers, their families, and society.

The Impact of Unplanned Pregnancies

Unplanned pregnancies are commonplace in Canada (Black et al., 2015). They can affect the health of the unborn fetus and the mother, impose a social and personal economic burden, and affect the quality of life of women and their families.

Health of the fetus and mother. Unplanned pregnancies have health implications for both the fetus and the mother. Mohllajee, Curtis, Morrow, and Marchbanks (2007) found that pregnancy intention was an indicator for poor fetal outcomes including preterm delivery and low birth weight. It's hard to speculate whether an unplanned pregnancy is a risk factor for these outcomes, or whether it is an indicator for other factors such a late prenatal care or prenatal exposure to teratogens. In either case, improved fetal health is associated with planned versus unplanned pregnancies (Mohllajee et al., 2007).

The maternal health effects of an unplanned pregnancy include higher rates of premature rupture of membranes, pregnancy induced hypertension, and depression (Mohllajee, et al., 2007). Furthermore, mothers of unplanned pregnancies are also more likely to engage in harmful health practices such as smoking, high caffeine intake, less exercise, poorer diet, and lower rates of vitamin supplementation (Yanikkerem, Ay, & Piro, 2013). Additionally, the fetus is at higher risk of inadvertent exposure to teratogenic medications and alcohol (Yanikkerem, Ay, & Piro, 2013). By preventing unplanned pregnancies, we can improve the health and well-being of mothers and their prospective children.

Economic implications for unplanned pregnancies. In an experimental cost model, Black et al. (2015) estimated that each unintended pregnancy in Canada costs an average of $2100. This estimate accounts for the cost of common fetal outcomes: birth, induced abortion, miscarriage or ectopic pregnancy (Black et al., 2015). Since most births in Canada are publically financed, this equates to an annual public cost is $320 million (Black et al., 2015). This, however, underestimates the total cost, as it only includes the direct medical costs associated with these four fetal outcomes. Other expenses include the social costs of unplanned pregnancies such as adoption, fostering, childcare; and the personal costs incurred from lost wages and having an additional child (Udeh, Losech, & Spies, 2009). Though the estimated by Black et al. (2015) provide what is likely a significant underestimation, their conclusion remains: by improving reliable contraceptive methods in Canada, we can prevent unplanned pregnancies, and reduce this economic burden.

Quality of life. Schwarz, Smith, Steinauer, Reeves, and Caughey (2008) assessed the effect that an unplanned pregnancy has on women's quality of life. They found that each case can have severe implications, affecting her education, work, family and social life. Limiting pregnancies to those that are planned, can help to reduce these negative impacts on quality of life.

A large Canadian survey found that 35% of women meet the criteria for having an unmet need for contraception (Black et al., 2009). This unmet need directly affects the rate of unplanned pregnancies. Unplanned pregnancies are expensive, they influence the health of our women and their children, and they impact the quality of their life. Canada needs to improve its contraception use, but what are our options?

Contraception Methods

There are many methods of contraception approved for use in Canada. Each can be classified based on their mechanism of action and their duration of effect. These include barrier methods, short-acting, long-acting reversible, long-acting non-reversible, and other methods. The efficacy of contraception types is often reported as perfect-use, or typical-use failure rates (Zildar, Upadhyay, & Lande, 2011). These rates are reported as the number of women out of a hundred who become pregnant during the first 12 months of use. Perfect-use failure rates are often measured during clinical trials when a woman and her partner follow the exact directions for use, yet they still become pregnant. It represents the efficacy of the contraception in a controlled setting, and with perfect use. Typical-use failure rates, on the other hand, measure the real-world effectiveness of the contraception using population-based survey data. The typical-use failure rate is a realistic measurement of a methods efficacy taking into consideration user compliance, human error, and other real-life variables. Typical-use failure is measured on an ongoing basis after the contraception has been used for many years which means efficacy can vary depending on the source of the data. A recent large-scale American review of contraception effectiveness was published by Sundaram et al. (2017). This recent publication is in use for the remainder of this discussion.

Barrier methods. Barrier methods include the male condoms, female condoms, the diaphragm, and others. These methods all operate on the same principle: by providing a physical or chemical barrier to the sperm, preventing its passage through the cervical canal. The most common barrier method is the male condom, accounting for 15% of contraception use in Canada, while female barrier methods are less common: the female condom, diaphragm, cervical cap, and spermicides together account for less than 1% of all contraception use in Canada (United

Nations, 2011). Barrier methods are highly available in Canada as they do not require a prescription and are cheap to obtain; furthermore, some have the added benefit of preventing STI transmission. The disadvantage of these methods, however, is that they need to be applied with each sexual encounter, making them highly susceptible to typical-use failure. Male condoms, for example, have a 2% perfect-use failure rate (Zildar et al., 2011); however, in the real-world, typical-use failure rises to 12.6% (Sundaram et al., 2017). Female condoms have a typical-use failure rate of 21%, a factor that has been attributed, in part, to poor compliance (Zildar et al., 2011). The availability and simplicity of male and female condoms make them invaluable in preventing unplanned pregnancies and reducing the spread of STIs, however, due to their high typical-use failure rates they should not be relied on as the sole contraceptive method for pregnancy prevention.

Oral contraception. Oral contraception (The Pill) is a daily low-dose of estrogen, progesterone, or both, that is taken orally. Depending on the hormone used, the pill prevents ovulation, implantation, or endometrial proliferation. The Pill is one of the most widely used methods of contraception in Canada accounting for 21% of contraception, though it only accounts for 8% of contraception worldwide (United Nations, 2011). The efficacy of The Pill depends on how regular it is used, how often it is missed in a cycle, and the variability of when it is taken each day. For example, the perfect-use failure rate of The Pill is 0.3% (Zildar et al., 2011), but this increases to 7.2% with typical-use (Sundaram et al., 2017). Oral contraception is effective, and widely used in Canada, but its typical-use failure rates make it less reliable. It is, therefore, a poor option for those who are unable to take a daily pill reliably.

Injectable progesterone. Progesterone can be injected intramuscularly every 2-3 months. This synthetic progesterone is absorbed slowly over several months and interrupts the hormones in the

hypothalamic-pituitary-gonadal axis preventing ovulation, reducing fertility. It accounts for 3.5% of the worlds contraception use, and 1% of contraception in Canada (United Nations, 2011). The advantage is that it is only required every few months and it does not contain estrogen, making it an option for women who are estrogen intolerant or for whom estrogen is contraindicated. If taken regularly, injectable progesterone is highly effective, though it requires regularly scheduled injections to maintain its efficacy. This result is that the perfect-use failure rate of 0.3% to increase to 4% with typical use (Sundaram et al., 2017).

Permanent contraception. Permanent contraception is a non-reversible method that involves a surgical procedure to induce sterilization. While these methods are highly effective, they are non-reversible and should, therefore, be reserved for families who have completed reproduction.

Female sterilization otherwise known as tubal ligation or tying the tubes is a procedure that either cuts or blocks both fallopian tubes, preventing the ovum from meeting the sperm. It provides effective, life-long contraception; and notwithstanding the low-risk surgical procedure, it has very few side effects (Zildar et al., 2011). Three methods are used: hysteroscopy sterilization, laparoscopic band application and laparoscopic coagulation, each varies slightly in efficacy (Gariepy, Creinin, Smith, & Xu, 2014). Together they account for 11% of contraception used in Canada, and 19% worldwide (United Nations, 2011). The failure rate of female sterilization varies depending on the method used, and there are rare cases of previously effective tubal ligations independently reversing themselves (Patil & Jensen, 2016), as such, the failure rate is approximately 0.5% (Zildar et al., 2011). In some instances, salpingectomies, oophorectomies, and hysterectomies have failure rates that approach zero percent. In these cases,

however, contraception has been achieved secondarily through a procedure performed for a purpose other than contraception.

Male sterilization, known as a vasectomy, is a simple surgical procedure that cuts or blocks the vas deferens, preventing sperm from entering the semen (Zildar et al., 2011). In Canada, 22% of contraception users rely on male sterilization (United Nations, 2011). Unlike a tubal ligation, the efficacy of a vasectomy can be confirmed through a semen analysis. Initially, the failure rate of a vasectomy is 2-3%, but this decreases with each year that passes. A vasectomy can be reversed; however, it is expensive, and often ineffective (Zildar et al., 2011).

Traditional methods. There is a set of contraception techniques collectively referred to as traditional methods that involve modifying the method or timing of intercourse to prevent pregnancy. Fertility awareness methods, also known as timing or natural family planning, require a woman to know when she is fertile and to avoid intercourse during that time. Several strategies that can be used to track the ovarian cycle such as following the date on a calendar, monitoring symptoms such as cervical secretions, and basal body temperature. Other methods include withdrawal, whereby the man removes his penis from the vagina during intercourse before ejaculation (Zildar et al., 2011). These traditional methods account for 6% of the global contraception method, and up to 9% of the contraception in Canada (United Nations, 2011). Pregnancy rates for traditional methods range from 22-26% (Polis et al., 2016) making them the most unreliable forms of contraception for long-term pregnancy prevention.

Long-acting, reversible contraception. Long-acting reversible contraction (LARC) is a class of contraception which, as the name implies, has a long duration or action and is reversible. There are two types of LARC: the implant and the intrauterine device (IUD), which also known as Intrauterine Contraception (IUC), and Intrauterine System (IUS) (Black et al., 2016).

An implant is a small flexible plastic rod that is inserted subdermally into the upper lateral fourth of the arm. There, it slowly releases a low dose of etonogestrel, a synthetic progestin that prevents ovulation. An implant can remain in situ for three years and removed at any time, with an almost immediate return to fertility (Zildar et al., 2011). Unfortunately, the implant is not approved for use in Canada, and it accounts for only 0.3% of the global contraception use. (United Nations, 2011). Since this device is inserted once and can be kept in place for many years, there are no opportunities for user error; so typical-use and perfect-use pregnancy rates are both 0.6% (Polis et al., 2016).

The IUD is the only LARC available in Canada. It is a small flexible polyethylene T-shaped frame inserted into the uterus through the cervix. The procedure is straightforward, but it requires a clinician with the requisite skills and equipment (Bayer, 2014a). An industry-funded RCT by Nelson, Apter, Hauck, and Schmelter (2013) found that 96% of IUDs are inserted with a single attempt. Sixty-four percent of women reported little or no pain, and 8% of women only reported severe pain during the IUD insertion (Nelson, Apter, Hauck & Schmelter, 2013). Each device can remain in place for 3-10 years depending on the type, and it provides reliable contraception until removal. Some IUDs have a reservoir containing levonorgestrel (LNG-IUD) that slowly releases over several years; others, such as the copper IUD (Cu-IUD) are non-hormonal, relying on copper as the active component. In Canada, IUDs account for less than 1% of contraception, which when compared to the global average of 14%, has one of the lowest rates of IUD use in the world (United Nations, 2011). Like the implant, once inserted, there is no margin for user error, so the typical-use and perfect-use pregnancy rates for IUDs are both 1.6% (Polis et al., 2016).

IUDs are wholly underutilized in Canada. Instead, most Canadians rely on oral contraception and condoms as their primary method of reversible contraception (United Nations, 2011) despite recommendations by the Society of Obstetricians and Gynecologists of Canada (SOGC) that "health care professionals should offer IUCs as a first-line method of contraception to both nulliparous and multiparous women" (Black et al., 2016). It is for these reasons that I am focusing on identifying barriers to IUD use in Canada. My hope is that by identifying these barriers, we can work towards reducing them and improving access to IUDs in Canada. The end goal is to improve the unmet need for reliable contraception among Canadian women and help to prevent unplanned pregnancies.

The Mechanism of Action of the IUD

The dominant action of the LNG-IUD is its local progestogenic effect on the uterus; creating thick cervical mucous that prevents the sperm from passing through the cervical canal. The hormonal effects also prevent endometrial thickening, and some women may develop amenorrhea (Ortiz & Croxatto, 2007). An old study of only 138 women found that "fertility seems to be unaffected after use of an LNG-IUD" (Andersson, Batar, & Rybo, 1992, p.585. Despite the age of this publication and its low enrollment numbers, it appears to be the primary source for return-to-fertility data. More recently, a systematic review (Mansour, Gemzell-Danielsson, Inki, & Jensen, 2011) confirmed a one-year return to fertility rate of 79-96% after the removal of an LNG-IUD. This is comparable to the estimated 1-year Canadian fertility rate of 86% (Bushnik, Cook, Yuzpe, Tough, & Collins, 2012). Despite this reassuring evidence, it is still possible that the LNG-IUD delay fertility for some women, though the expert consensus by the SOGC is that it is a safe, reliable, reversible contraceptive option (Black et al., 2016). Contraindications for the LNG-IUD are few. Of course, if a woman is pregnant, or if she is

allergic to any of the ingredients it should not be used. Additionally, if she has any hormone dependent cancers, fibroids that affect her uterine anatomy, current PID, or active liver disease (Bayer, 2014a, Bayer 2014b, Bayer 2016), they should not be used. A complete list of contraindications for all types of LNG-IUDs can be found in Appendix 1.

The Cu-IUD has a very different mechanism of action. It releases copper ions into the luminal fluid throughout the genital tract resulting in aseptic inflammation that is toxic to the spermatozoa (Ortiz & Croxatto, 2007). Since the Cu-IUD is a nonhormonal contraception, it does not have the same progestogenic effects and therefore has fewer contraindications for its use. The main difference between the Cu-IUD and the LNG-IUD is that the copper device often results in heavier menstrual flow, while the levonorgestrel device can cause amenorrhea (Ortiz & Croxatto, 2007)

For the remainder of this discussion, I will be referring to both copper and levonorgestrel IUDs together simply as IUDs. While each device has a distinct mechanism of actions and each with their clinical indications, their efficacies and function are similar; and can both be used as reliable contraception in Canada.

Medical Eligibility Criteria

Through a comprehensive review of the literature, and with extensive consultation of experts, the World Health Organization established medical eligibility criteria (WHO MEC) for each class of contraception. This criteria outlines which medically relevant condition preclude a woman from a particular contraceptive method. It also classifies each contraceptive method into one of the four categories based on this medical condition. The categories include:

1. A condition for which there is no restriction for the use of the contraceptive method

2. A condition where the advantages of using the method generally outweigh the theoretical or proven risks
3. A condition where the theoretical or proven risks usually outweigh the advantages of using the method
4. A condition which represents an unacceptable health risk if the contraceptive method is used (WHO, 2015).

For example, when considering a woman's age, LNG-IUDs are WHO MEC category 1 for women of all ages. Conversely, when considering a woman with active breast cancer, LNG-IUDs are at category 4 (WHO, 2015). WHO MEC has become the standard of care for all providers who prescribe contraception. Anyone who prescribes these medications or who are involved in family planning should be familiar and comfortable with these criterions.

A Brief History of Contraception in Canada

Contraception in Canada was plagued with many challenges that have slowed its progress during the past half-century. Before 1969 it was illegal to provide hormones for contraceptive purposes (Liao & Dollin, 2012). Much of the early contraception research was, therefore, performed in Puerto Rico with fewer ethical considerations and where no laws could restrict its use (Rock, Pincus, & Garcia, 1956). Despite contraception being legal for the past 48 years, advancements have been slow. Oral contraception has improved somewhat by using new synthetic hormones at lower doses; the effect being fewer side effects and improved compliance. Surgical techniques and barrier methods have also improved during this time (Liao & Dollin, 2012). Despite these minor advancements, contraception remains imperfect often accompanied with many side effects.

In the 1970s 10% of women relied on IUDs. These numbers fell quickly after being associated with severe complications (Hubacher, 2002) such as maternal death from sepsis (Christian, 1974), and acute PID leading to infertility (Burkman, 1981). One device caused these complications: The Dalkon Shield. This device had design flaws making it susceptible to infection and subsequently withdrawn from Canadian market in 1980's. Unfortunately, over 200 000 women worldwide were injured from this device (Byrne, 1990) and some speculate that this incident caused skepticism towards all IUDs and is responsible for the current IUD rates (Hubacher, 2002). Since then, IUDs remained available, and modifications have been made to improve their safety and efficacy.

Today are two LNG-IUDs used in Canada, the Mirena and Jaydess (Black et al., 2016). Health Canada has recently approved a third, the Kyleena, though it is not yet fully available (Government of Canada, 2017). All three LNG-IUDs are similar and are manufactured by the Bayer Inc. Their primary difference is their dosage of levonorgestrel. The Mirena IUD contains 52 mg of levonorgestrel that initially delivers 20 mcg per day (Bayer, 2014a). This rate diminishes over time until after five years when it needs to be removed (Bayer, 2014a). The Jaydess IUD only contains 13.5 mg of levonorgestrel and is approved for three years (Bayer, 2014a). The Kyleena is a low-dose IUD containing 19.5 mg of levonorgestrel, releasing 9 mcg per day over five years (Bayer, 2016).

There are many different Cu-IUD options available in Canada. Bayer Inc provides the NovaT, Prosan Inc manufactures the Flexi-T, 7MED Industrie Inc offers the Liberte, and Besins Healthcare Canada Inc makes the Mona Lisa IUDs (Island Sexual Health, 2014). These brands are available in a variety of sizes and copper dosages, and are marketed for either nulliparous or

multiparous woman (Zildar et al., 2011). Regardless of the brand or IUD size, all Cu-IUDs function similarly and have similar indications and contraindications.

Both copper and hormone IUDs are a reliable, safe and effective method of contraception. Since many Family Nurse Practitioners offer women's health services, it is important that Nurse Practitioners include IUDs as a contraceptive method.

Family Nurse Practitioner

Family Nurse Practitioners are increasing throughout Canada providing primary care for all populations in all stages of their life. They must, therefore, be skilled in providing a range of contraceptive care, and understand the full breadth of contraception options including IUDs. It is within the scope of a Family Nurse Practitioner to insert IUDs, however, like any advanced procedure, NPs must assure they have been trained "through formal theoretical and clinical learning" (College of Registered Nurses of British Columbia [CRNBC], 2016, p.47)

The function of a nurse practitioner (NP) is to combine "clinical diagnostic and therapeutic knowledge, skills and abilities within a nursing framework that emphasize holism, health promotion, and partnership with individuals and families, as well as communities." (Canadian Nurses Association [CNA], 2009, p. 1). Furthermore, NPs are expected to identify issues within the health system and be a part of systems-level changes (CNA, 2016). This means that NPs who offer contraception management, do so in a holistic framework in collaboration with clients, families, and communities. It also means that if barriers exist that are impeding this care, that they have the responsibility to initiate changes to eliminate these barriers. It is for these reasons that I am directing this discussion towards NPs who, like many other primary care providers, are positioned where they can identify unmet need for improved contraception in

Canada. Furthermore, they have the responsibility to be a part of changes that can help reduce these barriers.

Canada continues to have high rates of unplanned pregnancies with significant health, social and economic implications. Though the best method of preventing unplanned pregnancies is through reliable contraception, only 65% of Canadians use it (Black et al., 2015). The nine parameters outlined by the WHO suggest that barriers to contraception occur from discrimination, and/or lack of availability, accessibility, provision of information, quality services, privacy, participation, and accountability.

Since IUDs are the most reliable method of reversible contraception, and they remain underused in Canada, I have focused this paper on a review of the literature related to barriers to IUD use. The goal of this literature review is to identify how Nurse Practitioners, General Practitioners, and other primary care providers such as Midwives can reduce barriers to IUD use among Canadian woman. The purpose is not to promote IUDs, but rather to identify, and work towards the removal of barriers to IUDs. I have made recommendations based on the findings from the literature and directed them towards primary care providers to help overcome these barriers. With this, I hope to improve informed decision making regarding contraception and all the available contraceptive options.

Chapter 2: Search Methods

The literature was systematically searched to answer the question: how can family nurse practitioners reduce barriers to IUD use among Canadian women?

Database Selection

To focus this literature review, a search of relevant databases was achieved. A search of "international literature on biomedicine, including the allied health fields and the biological and physical sciences, humanities, and information science as they relate to medicine and health care" (National Library of Medicine, 2016) was performed by searching Medline, using the search engine Ovid. To assure no publications were missed, Medline was also searched using PubMed in NCBI. To "access the best and most current nursing and allied health literature" (EBSCOhost Research Databases, 2016), EBSCO was search using CINHAL. To explore the specific field of nursing education, Education Resource Information Center (ERIC) database was searched. Since contraception is a topic that is innately gendered, it was important to include publications from the field of women's studies, therefore a search of Women's Studies International (WSI) database was performed. Since barriers to health care are often twined with economics, EconLit was also. To consider the perspective of through a faith-based lens, publications from spiritual and religious journals were searched through The University Press Online database. And finally, since no thorough literature search is complete without exploring systematic reviews, the evidence-based medicine (EBM) reviews database was searched. Medline, CINHAL, ERIC, WSI, EconLit, University Press and EBM reviews were all searched using similar search terms. The methods, however, varied slightly due to the variation in the functionality of each program used. I will first explain how each search term was selected and then describe how the terms were applied to each database. I will then discuss how information

from the gray literature was obtained.

Search Terms

The term Intrauterine Device was searched, and when possible the expanded MeSH headings or exploded terms were used. The MeSH headings and exploded terms included many different words used for intrauterine devices, however, neither included brand names. It is for this reason that additional terms were added to include specific brand names, including the two Canadian LNG-IUDs: Jaydess and Mirena; and the various copper IUD trade names: FlexT380+, LiberteTT380, Liberte UT 380, Mona Lisa 10, Mona Lisa 5, Mona Lisa N, CuT380, Flex T 300, Flex T 300+,and Nova T 200.

Since the purpose of this review is to identify barriers associated with using IUDs, Merriam-Webster's Thesaurus (2014) was used to determine synonyms for the term barrier. Synonyms included: impede, hinder, obstacle, obstruction, and restriction.

During a preliminary review of the literature, before this systematic literature search began, a study by Hauck and Costescu (2015) titled Barriers and misperceptions limiting widespread use of intrauterine contraception among Canadian women was found. Since this study closely relates to my research question I used the tagged search terms from this article to identified new terms directly related to this topic. These new terms included Health Services Accessibility, Sex Education, Patient Education, and Program Evaluation. I then added these new search terms to each systematic search.

Search of Medline

To explore fields of life science and biomedical information, the database Medline was searched using OVID. A search for all publications containing intrauterine devices was completed using the broad MeSH headings. By exploding the headings, I noted that copper IUDs

were absent from this search. Furthermore, brand names were not included. To address these two shortcomings, Intrauterine devices, copper and the related MeSH terms and the Canadian IUD trade names were added to this search. These three searches were combined using the Boolean operator OR. To keep this initial search broad, no limits were placed on this search.

The next search was conducted to identify publications related to barriers or restrictions. The term barrier and its synonyms were searched. Next, the new set of search terms from Hauck and Costescu (2015) were added using the Boolean operator, OR. Again, to keep these searches broad, no limits were placed on either.

These two broad searches were then combined using the operator AND, producing over 600 results. Limitations were then applied to restrict the publication period to the previous ten years. Though it may have been helpful to limit the search to publications originating in Canada, OVID does not permit geographical restrictions, so no further limits were applied. The resulting 278 publications were thinned down to 31 by manually reviewing titles of each article for relevance. Again, these searches were reduced to 6 publications by examining their abstracts for relevance. I have summarized this search of Medline in Table 1.

Table 1

Literature Search of Medline Using OVID.

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (mm-dd-yyyy)
1	MEDLINE	Intrauterine Device MeSH headings: contraceptive device, intrauterine contraceptive devices, intrauterine contraceptive iud contraceptive iuds device, intrauterine contraceptive device, intrauterine devices, intrauterine contraceptive devices, intrauterine iud, contraceptive iud, unmedicated iuds, contraceptive intrauterine contraceptive device intrauterine contraceptive devices intrauterine device intrauterine devices unmedicated iud unmedicated iuds	None	8299	11-04-2016

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (mm-dd-yyyy)
2	MEDLINE	Intrauterine devices, copper MeSH headings: copper intrauterine device copper intrauterine devices copper releasing iud copper-releasing iud copper-releasing iuds device, copper intrauterine devices, copper intrauterine iud, copper releasing iud, copper-releasing iuds, copper-releasing intrauterine device, copper intrauterine devices, copper	None	1830	11-04-2016
3	MEDLINE	Mirena OR Jaydess OR FlexT* OR Liberte* OR Mona Lisa OR CuT380 OR Nova T 200	None	779	11-04-2016
4	MEDLINE	Impede synonyms: Impede* OR hinder OR Barrier* OR obstacle* OR obstruct* OR restrict*	None	920 000	11-04-2016
5	MEDLINE	Health Services Accessibility OR Sex Education OR Patient Education as a Topic OR Program Evaluation	None	1.09 M	11-04-2016
6	MEDLINE	(1 OR 2 OR 3) AND (4 OR 5)	Publication dates 2006-2016	278	11-04-2016

Search of PubMed

To ensure a thorough search of the biomedical literature, Pubmed was searched using NCBI. I applied the same search methods, and terms used to search Medline in OVID described above. Of the 504 results, 66 were found to have appropriate titles. I reviewed their abstracts, and

45 were found to be directly related to the research question. Of these, all but one had already been previously identified by searching Medline, suggesting that saturation of the searches within PubMed and Medline was achieved.

Table 2

Literature Search of PubMed using NCBI.

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (mm-dd-yyyy)
1	PubMed	Intrauterine Device Exploded terms: Contraceptive Devices, Intrauterine; IUD; Pessaries, Intracervical; Pessaries, Intrauterine; Intrauterine Device; Contraceptive Device, Intrauterine; IUDs; Pessary Intracervical; Pessary Intrauterine	none	12 565	11-04-2016
2	PubMed	Mirena OR Jaydess OR FlexT* OR Liberte* OR Mona Lisa OR CuT380 OR Nova T 200	None	6014	11-04-2016
3	PubMed	Impede synonyms: Impede* OR hinder OR Barrier* OR obstacle* OR obstruct* OR restrict*	None	1.01M	11-04-2016
4	PubMed	Health Services Accessibility OR Sex Education OR Patient Education OR Program Evaluation	None	203 000	11-04-2016
5	PubMed	(1 OR 2) AND (3 OR 4)	Publication dates 2006-2016	504	11-04-2016

Search of CINAHL

To search fields of nursing, allied health, biomedicine and healthcare, similar terms previously applied to PubMed and Medline were used to search CINAHL. Minor differences in this search arose due to subtle differences in the EBSCOhost program. Search 1 included the exploded terms of intrauterine device, which is defined by CINHAL as "mechanical devices inserted into the uterine cavity for contraceptive purposes" (EBSCOhost Research Databases, 2016). Search 2 was added to include the brand names of the Canadian hormone releasing intrauterine devices. Search 3 included the synonyms of barrier, and search 4 included the new search terms from Hauck and Costescu (2015). This search produced 290 results, which was then reduced by limiting publications from the past 10 years. The title of each publication was screened for relevance, and the remaining were sifted by reviewing the abstracts. The resulting 12 publications were identified as relevant, of them, 6 were unique to this search.

Table 3

Literature Search of CINAHL using EBSCOhost.

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (mm-dd-yyyy)
1	CINAHL complete	Intrauterine Device Exploded terms: Contraceptive Devices, Intrauterine; IUD; Pessaries, Intracervical; Pessaries, Intrauterine; Intrauterine Device; Contraceptive Device, Intrauterine; IUDs; Pessary Intracervical; Pessary Intrauterine	none	2381	11-24-2016
2	CINAHL complete	Mirena OR Jaydess OR FlexT* OR Liberte* OR Mona Lisa OR CuT380 OR Nova T 200	None	189	11-24-2016
3	CINAHL complete	Impede synonyms: Impede* OR hinder OR Barrier* OR obstacle* OR obstruct* OR restrict*	None	142 000	11-24-2016
4	CINAHL complete	"Health Services Accessibility" OR "Sex Education" OR "Patient Education" OR "Program Evaluation"	None	92 000	11-24-2016
5	CINHL complete	(1 OR 2) AND (3 OR 4)	Publication dates 2006-2016	185	11-24-2016

Search of Other Databases

EconLit, ERIC, and WSI were all searched using EBSCOhost using the same search

terms. Table 4 summarizes this search. The resulting 154 publications were sifted for relevance, and 14 novel publications were identified. The University Press Online was searched using the same search terms and method, and a single paper-based publication was identified.

Table 4

Literature Search of EconLit, ERIC and Women's Studies International using EBSCOhost.

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (mm-dd-yyyy)
1	EconLit, ERIC, Women's Studies International	Intrauterine Device	none	1053	12-01-2016
2	EconLit, ERIC, Women's Studies International	Mirena OR Jaydess OR FlexT* OR Liberte* OR Mona Lisa OR CuT380 OR Nova T 200	None	485	12-01-2016
3	EconLit, ERIC, Women's Studies International	Impede* OR hinder OR Barrier* OR obstacle* OR obstruct* OR restrict*	None	114 000	12-01-2016
4	EconLit, ERIC, Women's Studies International	Health Services Accessibility OR Sex Education OR Patient Education OR Program Evaluation	None	62 000	12-01-2016
5	EconLit, ERIC, Women's Studies International	(1 OR 2) AND (3 OR 4)	Publication dates 2006-2016	154	12-01-2016

Search the Evidence Based Medicine Reviews

Since the EBM Reviews database uses OVID, the same search method used to search Medline was employed. The titles and abstracts of the resulting 146 publications were reviewed, 15 were identified as relevant, and only 5 were unique. The other 10 had been previously identified during prior searches. This suggests that our searches reached a satisfactory level of saturation. Details from this search are summarized in table 5.

Table 5

Literature Search of EBM reviews using OVID.

Search #	Databases	Search term used	Limits applied	Number of results	Date searched (dd/mm/yy)
1	All EBM Reviews	Intrauterine Device OR IUD OR Jaydess OR mirena OR Copper-T	None	866	All
2	All EBM Reviews	Impede* OR hinder OR Barrier* OR obstacle* OR obstruct* OR restrict*	None	60 900	All
3	All EBM Reviews	Health Services Accessibility OR Sex Education OR Patient Education OR Program Evaluation	None	16 167	All
6	All EBM Reviews	1 AND (2 OR 3)	None	146	2006-2016

Searching Beyond Databases

In addition to searching databases for peer reviewed literature, a search of community resources, national and international data, and drug monographs was also performed. These independent websites searched are summarized in table 6.

Table 6

Website Searches of Community Resources, National Data and Drug Information.

Name of Organization	Website	Information acquired
The Options for Sexual Health	https://www.optionsforsexualhealth.org	Current, local, contraceptive resources.
Canadian Public Health Association	http://www.cpha.ca	History of contraception and sexual health in Canada.
Canadian Institute for Health Information	http://www.cihi.ca	Canadian-specific pregnancy information, particularly focusing on unplanned pregnancy rates
World Health Organization	http://www.who.int	1. WHO MEC criteria 2. international contraceptive rates
Non-Insured Health Benefits	http://www.healthycanadians.gc.ca	Contraception insurance coverage for those under the NIHB plan
Student Health insurance benefits	http://studentcare.ca/	Contraception insurance coverage for those under the NIHB plan
Bayer Inc.	http://omr.bayer.ca	Canadian drug monographs for IUDs.
Reddit	https://www.reddit.com/r/TwoXChromosomes/	Online, open source, public dialogue.

To broaden the data, I expanded the collection to include informal sources such as face to face discussions and online discussion boards. Face to face discussions occurred with Physicians, Nurse Practitioners, a Midwife and a Pharmacist. The topics of these conversations included their professional and personal perceptions on IUDs, as well as their impressions on barriers that woman face obtaining them. Additionally, we discussed strategies to reduce some of these barriers, focusing on training opportunities that each professional received during their initial training and as continued medical education.

To learn of the public discourse about IUDs I searched the American social news aggregation: Reddit. Within Reddit, there is a popular sub-Reddit titled TwoXChromosomes; a forum specifically "intended for women's perspectives" (Reddit, 2017). TwoXChromosomes has over ten million active followers and contains dozens of discussions pertaining specifically to IUDs, each with hundreds of comments read by thousands of individuals. Reddit is a popular platform for individuals to openly discuss their personal experiences with IUDs and therefore it was a valuable resource to gather unfiltered and unmoderated information. In reading these posts, I obtained a unique perspective into the public understanding and dialogue of IUDs. These perspectives allowed me to have an improved understanding of personal lived experiences of women with IUDs. One caveat to these online forums is that they do not wholly represent the IUD experience, they merely provide insight into those which are chosen to be shared. Thus, these online discussions tend to be biased towards the extremes. Despite this bias, I was surprised to learn that many of these experiences were positive, and much of the shared information was accurate. I have included a rather small collection of excerpts from this Reddit forum in Appendix 2.

Appraisal of the Evidence

Five meta-analyses that had been retrieved from these searches were analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). I modified the PRISMA criteria and created a checklist for this process. The modified PRISMA checklist is found in Appendix 3. During this analysis, two of the five meta-analyses were found to be from the same data set. The meta-analysis by Arrowsmith, Aicken, Majeed, and Saxena (2012) was published in Contraception, and turned out to be the same meta-analysis used in their Cochrane Review (Arrowsmith,

Aicken, Saxena, & Majeed, 2012). Both these publications drew the same conclusion from the same data set. I was, therefore, cautious not to interpret them as unique studies. Instead, for this literature review, I treated them as a single study.

The remaining studies were appraised using the Critical Appraisal Skills Program (CASP), an evaluation technique that had initially been presented by Oxman et al., (1994). The CASP appraisal checklist has been modified, and specific versions were developed for Randomized Control Trials, Case Control Studies, Cohort Studies, and Qualitative Research (Critical Appraisal Skills Programme, 2017a; Critical Appraisal Skills Programme, 2017b; Critical Appraisal Skills Programme, 2017c; Critical Appraisal Skills Programme, 2017d). A simplified version of these checklists are found in Appendices 4-7.

Summary of Methods

Overall, the quality of these studies was good; however, they had significant industry influence. Both the PRISMA and CASP appraisal tools helped guide the appraisal of each study, which is discussed in more detail in the Findings section in Chapter 3.

The data obtained from the 32 publications retrieved in this search will make up the evidence used for the Findings and Recommendations sections in Chapters 3-4. I am not claiming that this search was exhaustive or comprehensive, however, due to the repeat and redundant results found in each search, I am satisfied that these search methods achieved sufficient saturation and that an accurate representation of the literature was obtained. I am, therefore confident that this search was sufficiently thorough in delivering conclusive results, which can guide me towards making evidence-based recommendations. The following two chapters will present these findings and make recommendations based on this data.

Chapter 3: Findings

A meta-analysis by Hauck and Costescu (2015) categorized the barriers that Canadian women face obtaining IUDs into three broad categories:

1. professionals who are providing contraception counseling and prescribing contraceptive methods: Health care Providers (HCPs),
2. women who are seeking or who would benefit from contraception: contraception users, and
3. organizational structures in which healthcare and pharmaceuticals are delivered: the healthcare system.

I have used these three categories as a theoretical framework to discuss my findings throughout this chapter. I have used these findings to build the recommendations presented in the discussion in Chapter 4.

Barrier 1: Health Care Provider

Contraception such as condoms, spermicides, diaphragms, and caps are readily available through drug stores and community health services without the need for a prescription. Other traditional methods such as family planning and withdrawal can be learned and achieved independently. The advantage of these methods is that they can be obtained independently, and do not require an HCP. The disadvantage is that when they are used alone, they have high typical-use failure rates and cannot be relied on as a sole means to prevent pregnancies. Alternatively, more effective contraceptive methods such as oral and implantable hormones, and surgical sterilization are more reliable; however, they depend on an HCP to provide them. This dependence can limit availability, as it relies on the knowledge, skills, training, abilities, beliefs, and biases of the HCP. IUDs are especially dependent on HCPs for both the prescription and the

insertion of each device. This dependence can act as a barrier to acquiring them. Poor provider knowledge about IUDs, and a lack of training in their insertion have been shown to inhibit IUD use (Black, Lotke, Buhling & Zite, 2012; Black, Lotke, Lira, Peers & Zite, 2013; Buhling, Hauck, Dermout, Ardaens & Marions, 2014; Stubbs & Schamp, 2008)

Consistent and accurate knowledge is vital for contraceptive counseling by instilling trust in the provider (Dehlendorf, Levy, Ruskin, & Steinauer, 2010). The choice of language used to communicate this knowledge can also impact this trust (Belfield, 2010). For example, some providers use the term, long-acting reversible contraception (LARC), to describe all IUDs and implants, with the thought that LARC implies efficacy and reversibility. Some women, however, are concerned with this term, understanding that it may create a prolonged time of return to fertility (Glasier, Scorer, & Bigrigg, 2008). We need to assure that healthcare providers understand IUDs, and use language that is well understood by their patients.

Provider knowledge. A woman seeking contraceptive advice from her HCP is especially vulnerable to her provider's knowledge, as her provider will only advise on methods with which they are familiar. Poor IUD knowledge among HPCs can be broad, varied, and provider dependent. A small Canadian survey of 131 physicians with a response rate of 81% found that more than 60% of GPs believed that pelvic inflammatory disease and ectopic pregnancies were significant risks associated with IUDs. Furthermore, they found that over 70% of physicians would not recommend an IUD to a nulliparous woman (Stubbs & Schamp, 2008). This is despite recommendations from the SOGC that "Health care professionals should offer IUCs as a first-line method of contraception to both nulliparous and multiparous women" (Black et al., 2016, p.183). It has been suggested by Stubbs and Schamp (2008) that this inaccuracy of perceived risk

arises from providers having poor knowledge of the World Health Organization Medical Eligibility for Contraception (WHO MEC) criteria.

Black et al., (2013) asked 1862 HCPs about their beliefs and practices around IUDs in nulliparous women. They found that only 15% of respondents correctly identified nulliparity as WHO MEC category 1, and 23% replied that they did not know. The remaining 62% incorrectly assigned nulliparous women into lower eligibility.

Similarly, Buhling et al. (2014) surveyed 1103 HCPs and found that most providers were unable to correctly assign WHO MEC categories, mainly overestimating the risk associated with nulliparity and pelvic inflammatory disease. Unfortunately, the 1103 providers from this survey only represented a response rate of 15%, and only 100 of the participants were Canadian. Furthermore, the inclusion criteria for this study required that participants see more than 20 women per month for contraception counseling. These characteristics of this study limit its generalizability, especially in low volume, rural, Canadian clinics. Despite this limitation, the conclusions from Black et al. (2013), Buhling et al. (2014), and Stubbs and Schamp (2008) are evident; providers require improved education about the WHO MEC criteria, particularly for nulliparous women.

Difficulty with IUD insertion. Fear of a difficult IUD insertion is yet another reason HCPs may hesitate to recommend an IUD. In an industry funded systematic review looking at factors affecting IUD use among nulliparous women, Black et al. (2012) found that many HCPs associate nulliparity with a more difficult IUD insertion. This is despite strong evidence that parity has no effect on the difficulty of the insertion (Kaislasuo, Heikinheimo, Lähteenmäki, & Suhonen, 2014). This review concluded that IUD rates could increase if we were to improve the knowledge of insertion difficulty among HCPs (Black et al., 2012). Though this systematic

review did not include Canadian data, it did show a trend among many developed nations; that providers often incorrectly anticipate difficult IUD insertions. It is, therefore reasonable to infer that Canadian HCPs would also benefit from improved knowledge and skill managing difficult IUD insertions.

Excessive perception of risks. An online survey by Black et al. (2013) compared the perceived risk of IUDs among health care providers. They found that more experienced HCPs tended to incorrectly associate higher rates of PID and infertility with IUDs than their colleagues with less than 10 years of experience. Interestingly, similar results were found by Dehlendorf et al. (2010) who used a convenience sample of 524 health care providers (Nurse Practitioners, Physicians, and Physician Assistants) and found that many providers incorrectly associated infertility and PID with IUDs. Through a multivariate analysis, Dehlendorf et al. (2010) found that younger, female, and obs/gyne specialists tended to have more have more updated contraception knowledge, and were less likely to incorrectly associate IUDs with PID and infertility.

There are a few suggestions that can account the difference between experienced and less experienced providers. First, experienced providers tended to be older, and it is possible the tarnished reputation of IUDs caused by the infamous Dalkon shield of the 1960s persists in their memory. Secondly, it was suggested that newly trained Nurse Practitioners and medical residents are receiving improved IUD-specific training resulting in a better understanding of the risks associated with IUDs (E. Kruithof, personal communications, December 12, 2017). Though training is improving, and new providers are becoming more knowledgeable about IUDs, misinformation persists among providers, and educational initiatives need to be made.

Concern for pain. Misperceptions about IUDs among healthcare providers extend beyond nulliparous women, PID, and infertility. Understandably, providers are also concerned about inflicting pain on their patients. This concern can precipitate hesitance to recommend them (Buhling et al., 2014). The concern for pain with IUD insertion can propagate from the provider to the patient, and may further impact a woman's choice for an IUD. We can not ignore pain caused by an IUD insertion, as it is a reality for many women. In an extensive review of the online Reddit forum, many women feared pain leading up to their IUD insertion (Aldona, 2017). Though pain associated with this process varies among women, Black et al. (2012) found that it is often over-anticipated. By becoming properly informed, providers can set realistic expectations concerning pain caused by this procedure. Furthermore, HCPs should learn effective techniques for pain control to help reduce it.

Misunderstanding the mechanism of action. The systematic review by Black et al. (2012) also found that some providers misunderstand the mechanism of action of the IUD, believing that it prevents the implantation of a fertilized ovum. Similarly, in a randomized anonymous survey of 1100 European women, Lopez-del Burgo et al., (2012) found that many women believed IUDs to function as an abortifacient. Both HCPs and IUD users who believe that life begins at conception may determine it unethical to use a form of contraception that terminates a zygote. This belief persists despite a well-known mechanism of action in both the Cu-IUD and LNG-IUDs; that is, they act to prevent fertilization rather than preventing implantation (Ohly & Westhoff, 2015; Ortiz & Croxatto, 2007). Assuring that HCPs have an accurate understanding of this mechanism of action would help prevent the propagation of this misinformation.

Barrier 2: The IUD Users

In addition to misinformed HCPs, barriers to IUDs can also originate from misinformation among contraceptive users themselves. Misinformation can propagate among users and lead to poor public knowledge and poor IUD acceptance (Gomez, Hartofelis, Finlayson & Clark, 2015; Hall et al., 2016; Hauck & Costescu, 2015; Rubin & Winrob, 2010; Secura, Allsworth, Madden, Mullersman & Peipert, 2010).

Public knowledge. A large online multi item survey of 1892 American female undergraduate students assessed the knowledge and personal experiences with long acting reversible contraception (Hall et al., 2016). This survey found that 79% of women self-identify as having "little" or "no" knowledge about IUDs, and that this lack of knowledge, whether perceived or real, was correlated with women not choosing the IUD. The primary weakeness of this survey is that it restricted its sample population to post-secondary attendees. Though this limited sample makes the results difficult to generalize, it does indicate that well-educated women have poor IUD knowledge. Additionally, this survey had a meager response rate; 13000 surveys were sent out, and only 1892 responded, a response rate of 14%. This study did not address this low response rate nor did it perform demographic analyses of the 1892 respondents to see if they were statistically different than the initial 13000 sample. Despite these shortcomings, strength in this study resides in its multivariate analysis of several subpopulations. This study found even poorer IUD knowledge amongst ethnic minorities, unemployed women, those living on campus, and women of mothers with low education. Though this study was entirely American, it is reasonable to predict that these same subpopulations could have similar levels of IUD knowledge in other countries such as Canada.

Poor IUD knowledge was identified during a qualitative study involving Scottish women aged 16-24 (Okpo, Allerton & Brechin, 2014). A lack of IUD knowledge was demonstrated by many women, one of which, after being asked what she knew about long acting reversible contraception, replied: “Is that a hysterectomy?” (Okpo et al., 2014, p. 936). Rubin and Winrob (2010) also conducted a qualitative study with semi-structured interviews among women who self-identified as having some information about IUDs. Even among this select population, many knowledge gaps were identified.

Many HCPs report that a common concern among women is that IUDs may interfere with their long-term fertility. This was found through my communications with various HCPs (K. Black, personal communications, March 26, 2017; H. Dunbar, personal communications, April 12, 2017; E. Kruithof, personal communications, December 10, 2016). Gomez et al. (2015) also found that women were concerned about the return to fertility with IUDs. This concern persists despite a well-documented 1-year pregnancy rate of up to 96% after IUD discontinuation (Mansour, Gemzell-Danielsson, Inki, & Jensen, 2011). This confirms yet another area where a lack of user knowledge may act as a barrier IUD contraception.

Sources of contraceptive information. We cannot rely solely on HCPs to provide contraceptive education. In the Scottish qualitative study discussed above, Okpo et al. (2014) found that most contraceptive knowledge came through friends and family, and that women tended to rely on their GP solely to acquire the prescription for this contraception. They found that many women had already made up their minds on their method of contraception before the medical appointment. These women felt that their GPs did not have time to discuss it; and that most were male and would not understand their values (Okpo et al., 2014).

This was reiterated in an online American survey of 1154 University women by Gomez et al. (2015) who found that only 35% of contraception users received their information from an HCP. Instead, most of their information came from friends, the internet, and the TV. Due to this large variety of sources, and knowing that the most contraceptive information does not come from HCPs, we need to ensure that public education is accurate, accessible and available in the community.

Personal values. It is crucial that personal values and beliefs are considered when choosing any method of contraception. The qualitative study by Rubin and Winrob (2010) found that many women were unsettled by having a device sitting inside them for many years. This sentiment was confirmed in an anonymous online survey by Hall et al. (2016) who found that 44% of female university students did not want a foreign object in their body. Gomez et al. (2015) agreed that many women found the idea of an IUD to be "unattractive because they disliked the idea of a device in their bodies" (p.7). Though these three studies agreed that many women were uncomfortable with the thought of a foreign object inside of them, none of these studies could determine that magnitude that this discomfort would have in deterring a woman from selecting an IUD.

Several studies have also found that many women prefer having personal control in deciding when to initiate or terminate their contraception (Gomez et al., 2015; Hall et al., 2016; Rubin & Winrob, 2010). Lack of personal control is a fundamental disadvantage to the IUD as it can only be inserted or removed by a skilled provider. Another personal value to consider is that some women prefer to retain their menses, as some women are reassured by monthly menstruation confirming that they are not pregnant (Rubin & Winrob, 2010). This is important

when selecting which IUD to choose since the Mirena has a higher propensity for causing amenorrhea than any of the copper IUDs (Zildar et al., 2011).

These personal values are important considerations. Though the effect will vary with each person, they should always be considered. Making sure that women are well informed, with accurate information tailored to their needs is at the heart of reducing barriers to IUDs while honoring personal values.

Barrier 3: System-level barriers

The third barrier affecting IUD use is at health care system level (Hauck & Costescu, 2016). In this section, I will discuss how the current structure of our health care system can impede IUD use.

Personal cost. In Canada, the out-of-pocket cost for an IUD will depend on which device is selected, and individual's insurance coverage. For example, most women attending university have 80% coverage of medications (Student Care, 2017) and therefore incur a minimal cost. Other women, however, with no extended insurance can expect to pay $52-350 depending on the IUD that they choose (Island Sexual Health, 2014). Fortunately, in Canada, the cost for a clinician to insert the device is paid by our medical services plan. That is if a woman can find an HCP with the requisite knowledge and skills to provide this service. Since not all providers have these skills, a woman may need to travel to have this done. The personal out of pocket costs for the IUD, coupled with the potential cost of the trip may very likely be a barrier for some woman, particularly for those in rural and remote areas who may have to travel long distances. It is, therefore, much cheaper and simpler to choose the pill or injectable progestin, both of which can be administered easily.

Since IUDs are expensive it is important to consider how this may affect their use. The contraceptive CHOICE study was a large prospective cohort trial that looked at the effect that personal cost has on IUD selection, furthermore it demonstrated a system-level strategy that could be used to reduce this barrier (Secura et al., 2010). This study recruited almost 10 000 American women ages 14-45 years. The inclusion criteria were woman who identified as either being dissatisfied with their current contraceptive method, or wanting to initiate contraception; and who wanted to prevent a pregnancy for at least 1 year. This experiment offered women an opportunity to change their contraceptive method, accompanied by brief appropriate counseling, at no cost. The objective was to see which method would be preferred if cost was eliminated. They found that 56% of participants switched their contraception to IUDs, which when compared to the national American average of 3% (United Nations, 2011), is quite remarkable. In addition to removing financial barriers, the authors discussed other contributing factors to this high IUD uptake. First, in addition to their contraception, each participant was also provided with a standardized counseling of all contraceptive methods. It is possible that this process helped to dispel some of the rumors about IUDs that may have persisted amongst participants. Secondly, all contraception was offered equally regardless of age, parity, or history of STIs which may also have helped to dispel misinformation about IUDs. Secura et al. (2010) conclude that by eliminating cost, providing standardized contraceptive information, and by offering all contraceptive methods equally, that many women will preferentially choose IUDs. One important consideration that may have biased these results is that the inclusion criteria selected for women who were already dissatisfied with their current method of contraception. This may have favored women who already have an interest in IUDs. The strengths of this trial, however, are found in its simple methodology making the principle simple to understand, and in its large

sample size making it generalizable to an American population. For our purposes, however, its applicability to Canadians could be questioned. I argue, however, that American and Canadian cultures and values are not remarkably different, so applying these results to a Canadian population is not unreasonable.

The cost to the system. Two large studies, one American and one British, looked at the cost benefit of providing government funded contraception. In doing so, these studies demonstrated how the funding schemes of our health care systems might be acting as barriers to IUDs.

The Iowa initiative was an American project performed in 2007 that presented a benefit-cost analysis for publically funded family planning services (Udeh, Losech & Spies, 2009). This study estimated the cost of publically funded family planning (counseling and contraception) and compared it to the savings acquired from preventing unplanned pregnancies. This analysis focused on individuals living in Iowa who were receiving social assistance and public health care; a population for whom an unplanned pregnancy would increase the demand on public services. Udeh et al. (2009) found that for every dollar spent on family planning services, three dollars would be saved within one year. This savings grew when LARCs such as IUDs were used, as their one-time cost remains effective for multiple years. This study demonstrates that government level initiatives can improve IUD use by removing the barrier of cost through system-wide initiatives.

The limitations of this analysis are significant. First, it is especially difficult to predict the actual financial cost of an unintended pregnancy. It is for this reason that Udeh et al. (2009) simplified matters by only including expenses incurred from prenatal, delivery, antenatal services, and pediatric services for the first 5 years of the child's life. They did not include other

potential costs associated with complicated pregnancies, abortions, adoptions, or other possible pregnancy outcomes. This analysis, is, therefore, an underestimate of these benefits. A second limitation of this study is its focus on Iowa, a Midwestern American state. Despite this, I will suggest that since this study looked at low-income Iowa residents receiving social assistance and publically funded health care, that this population resembles Canadian citizens in that Canadians also receive publically funded health services. We can, therefore, carefully extrapolate that Canadians may also benefit fiscally from publically funded family planning services.

In a prospective cohort review of 283 British women, Cook and Flemming (2014) analyzed the long-term savings achieved by using long acting contraception. They found that the average length of IUD use was 3.44 years, resulting in an annual cost of £54. This price was found to be almost ten times cheaper than other forms of reliable contraception such as oral contraception and the progestin injections. Cost savings were attributed to the need for fewer clinic visits and the one-time cost of the contraception itself. Unfortunately, Cook and Flemming (2014) did not publish whole numbers comparing the costs of contraceptive methods. This makes it difficult to generalize these savings to other countries. Furthermore, the variability of pharmaceutical costs and providers' wages amongst countries makes it difficult to apply these results to a Canadian setting. Since Britain and Canada both have single-payer, publically funded health care systems, it is reasonable to conclude that Canadian women could also save money by using IUDs.

Both the Iowa initiative by Udeh et al. (2009); and the British Study by Cook and Flemming (2014) demonstrated that publically funded long-acting contraception could reduce system-wide barriers. Furthermore, a publically funded initiative can see system-wide cost savings in the long run

Product labeling. In Canada, there are two commonly used hormone-releasing IUDs available: the Mirena and the Jaydess, both of which are Bayer products. The Mirena delivers 52mg of levonorgestrel which is released over 5 years, while the Jaydess offers a lower levonorgestrel dose over 3 years. The Canadian Mirena drug monograph states "MIRENA is not the contraceptive method of first choice for young, nulligravid women" (Bayer®, 2014a, p.12). The Jaydess drug monograph, on the other hand, makes no reference to nulliparity only stating that "Safety and efficacy has been studied in women aged 18 and over" (Bayer®, 2014b, p.12). This discordance in product labeling exists despite both devices being safe for nulliparous women (Eisenberg et al., 2015). This inconsistency among product labels may introduce uncertainty and confusion among providers and the public when choosing a contraceptive method, and this confusion may be a barrier to IUD use.

Requirement for multiple office visits. The nature of IUDs is that they often require at least two separate medical office visits before the contraception is delivered. The first visit often involves counseling and providing the prescription for the IUD. And the second clinic visit, after picking up the IUD from the pharmacy, is to have the device inserted. A unique retrospective database review in an urban American clinic looked at the effect of this two-visit requirement, and the impact it has on IUD rates (Bergin, Tristan, Terplan, Gilliam & Whitaker, 2012). These authors found that of the 708 women who requested IUDs, fewer than half returned to have them inserted. Could requiring a second visit for the insertion act as a barrier to the IUD? Perhaps. Alternately, we must consider that this second clinic visit served as a buffer by providing women with an opportunity to reflect and reconsider their contraceptive choice. In a subset analysis, however, Bergin et al. (2012) found a correlation between the distance that women lived from their clinic and the likelihood that they would return and have the IUD inserted. They found that

those who lived farther from their clinic were less likely to go back to have it inserted. Since this analysis was a retrospective review, it's challenging to determine causality. Despite this, we must remain cognoscente of how repeat office visits for IUD insertions, especially for those who live far from the clinic, may act as a barrier to IUD use.

Summary of Findings

Multiple barriers to IUDs were identified. First, many health care providers lack knowledge about IUDs particularly regarding their eligibility criteria and their associated risks. This lack of knowledge may reduce the number of women for whom IUDs are recommended. Second, many women seeking contraception have a misunderstanding about IUDs and are receiving their information from non-healthcare sources. And third, the health system contains barriers that impede IUD use such as high cost, poor product labeling, and the necessity of multiple office visits. In the following chapter I will discuss recommendations that can be used to reduce these barriers.

Chapter 4: Discussion and Recommendations

Reducing barriers to IUD use among Canadian women is a vast undertaking. It requires buy-in and action from the public and health care stakeholders, as well as changes at educational, political, and economic levels. The discussion that follows is a collection of recommendations that arose from this research. These recommendations are not a final solution, but rather a small step forward towards helping to address this issue. These recommendations focus on how family nurse practitioners can contribute to this effort by reducing barriers to IUD use among Canadian women with the goal of reducing unplanned pregnancies. Barriers to IUDs in the previous chapter were organized into three categories: those associated with health care providers, the IUD user, and the healthcare system. The following discussion of recommendations will follow the same structure.

Recommendations For Healthcare Providers

A lack of contraceptive education among healthcare providers, particularly about IUDs, has been identified as a barrier to Canadian women obtaining them (Black et al., 2012; Buhling et al., 2014; Hauck & Costescu, 2015; Secura et al., 2010; Stubbs & Schamp, 2008). An Australian study found that with increased training opportunities, providers increased their knowledge, which in turn increased IUD prescriptions (Stewart, Digiusto, Bateson, South, & Black et al., 2016). The role of the Nurse Practitioner in British Columbia is to act "as a change agent through knowledge translation and dissemination of new knowledge" to provide leadership in clinical care, and as a resource person, educator and role model (CRNBC, 2015, p.15). This excerpt from the College highlights the public expectation that NPs be involved in ongoing scholarship and curriculum changes to promote evidence-based education. Education reform should focus on improving the understanding of the IUDs such as their indications and

contraindications; training of insertion techniques; and assessing and rectifying insertion and post-insertion complications.

Improving IUD understanding. Choosing language that is consistent and unambiguous to communicate information about intrauterine contraception is crucial when providing contraceptive counseling (Belfield, 2010). This includes using a single term for these devices and avoiding catch-all terms such as Long Acting Reversible Contraception. Doing so would reduce confusion and improve public understanding (Glasier et al., 2008).

The concern of inflicting pain on patients has been identified as a reason that IUDs are not recommended by GPs (Buhling et al., 2014). Additionally, Kaislasuo, Heikinheimo, Lähteenmäki, and Suhonen (2014) found that "pain was commonly assessed one step milder by the physician than the woman" (p. 6). In this study, physicians reported that 23% of their insertions caused severe pain, however, none of their insertions were intolerable. This perceived pain was entirely different from the women's' report of pain whereby 58% of women described insertions as being either severe or intolerable (Kaislasuo et al., 2014). This discrepancy highlights that pain is an ongoing challenge with IUD insertion, often underestimated by HCPs. These studies demonstrate the importance of proper pain control techniques such as premedication with NSAIDS and the use of a cervical lidocaine block (Lopez et al., 2015). It is vital that Nurse Practitioners incorporate evidence-based analgesic techniques into their practice when inserting IUDs. Furthermore, it is essential that Nurse Practitioners engage in ongoing research to improve these analgesia strategies. This ongoing challenge to control pain reminds us to remain patient-centered by establishing realistic expectations for pain, so women are not surprised by the discomfort that it causes. (Buhling et al., 2014).

In addition to pain, many providers are worried about difficult insertions (da Silva-Filho, Lira, Rocha & Carneiro, 2016). Since there are few parameters to predict a difficult insertion (Kaislasuo et al., 2014), many HCPs may hesitate to recommend them. There are few predictors for a painful and challenging IUD insertion, and this uncertainty causes reluctance among HCPs to offer them. This uncertainty highlights a need for improved training opportunities to problem solve difficult insertions, and to learn proper techniques for pain control. Furthermore, system-wide changes should be made to improve timely referrals to proficient HCPs with these skills. An efficient, expedited referral system will help unskilled HCPs to gain confidence in recommending IUDs, by assuring that their patient can easily access this service. Furthermore, it can instill trust among patients receiving this service.

Understanding indications and contraindications. It is paramount that all providers offering contraception have a strong knowledge of the indications and contraindications for all forms of contraception. Specifically, providers need improved education of WHO MEC, as this has been identified as an area of misunderstanding among many HCPs (Black et al., 2012). Of importance are young nulliparous women, as they are often informed that nulliparity is a contraindication to receive an IUD (Berlan, Pritt, & Norris, 2016; da Silva-Filho et al., 2016; Pritt, Norris & Berlan, 2016; Rubin, Coy, Yu, & Muncie, 2016). This misinformation persists despite nulliparous women under 20 being MEC category 2 for all IUDs: “the advantages of using the method generally outweigh the theoretical or proven risks” (WHO, 2015, p.5). By improving contraception education through enhanced understanding of indications and contraindications for all contraceptive methods, the rates of reliable contraception may increase, particularly for IUDs (Navarria, Julen, Narring, & Yaron, 2015).

Improving training opportunities. There appear to be recent ongoing curriculum changes directed towards improving IUD training and knowledge among HCPs (Black et al., 2013; Kruithof, 2017). Though this is promising, improved education and training is important, especially for providers with less recent training. Additionally, continuing medical education to maintain this proficiency is essential (Luchowski et al., 2014). In a skill-based training initiative Lewis, Darney and Thiel de Bocanegra (2013) held several training sessions for several months. They found that this initiative improved the rates of correctly identified IUD candidates, especially among nulliparous and adolescent women. The effects of this study are especially strong among smaller, low volume clinics. It is, therefore, important that we encourage continuing medical education directed specifically at improving contraception knowledge among smaller, low-volume clinics.

Recommendations for the IUD user

I have identified that a significant barrier to IUD use is attributed to a general lack of public knowledge about IUDs (Hall et al., 2016; Hauck & Costescu, 2015; Okpo et al., 2014; Rubin & Winrob, 2010). The focus of this section of recommendations will be on improving public knowledge by reducing misinformation and raising awareness about the IUD. The CRNBC Nurse Practitioner competencies state that NPs "provide information that is current, relevant and evidence informed" for each client's unique circumstance (CRNBC, 2015, p.11). This competency is set forth by our College, and will be at the heart of these recommendations.

It is important to pause for a moment and make the distinction between providing education, and coercion. I want to be unequivocal in stating that the goal is not to coerce women into choosing an IUD. Instead, the focus is on improving the accuracy and accessibility of contraceptive knowledge so that fully informed, patient-centered choices are made. This

distinction is important to make, as the goal is to assure that comprehensive contraceptive information is available to all women so that they can make informed decisions centered on their values and priorities. Some women, for example, value having personal control over when they can personally initiate or terminate their contraception (Gomez et al., 2015). For these women, IUDs may not be their contraceptive method of choice; instead, they may want to choose a more easily controllable method such as oral contraception. For other women who prefer reliability, efficacy, and simplicity, and who do not mind handing over the physical process of contraceptive initiation and termination, IUDs may be a good option. Regardless of her values, beliefs, or priorities, it is important that each woman has the necessary information about all contraceptive methods so she can make a fully informed decision (Hall et al., 2016).

Many women have already decided on a contraceptive method before they have met with their prescriber (Okpo et al., 2014). Some women may look to their friends, family, TV, or they go online for their information (Gomez et al., 2015). The result is that their information may be inaccurate or incomplete (Hauck & Costescu, 2015; Rubin & Winrob, 2010). For example, a woman with a friend who had a negative experience from an IUD may be reluctant to receive one. It is important that HCPs validate these concerns despite being anecdotal. Taking these personal experiences into consideration is a crucial step towards building trust with the provider and the healthcare system.

A public education initiative is another method that could be implemented to help improve public knowledge and raise awareness of IUDs. The purpose is to extend education beyond what is provided by the HCPs in primary care, and into the hands of policy makers within primary health care. Changes in primary health care, as opposed to primary care, involve changes on a large-scale systems-level, impacting entire populations rather than individuals.

Primary health care policy changes could improve awareness through education of all contraceptive methods, including IUDs, increasing awareness of their efficacy, safety, reversibility, and mechanism of action. These changes could also help to dispel myths about these contraceptive methods. It has been shown that by improving public knowledge of all methods of contraception, the rates of reliable contraception, especially IUDs will increase (Secura et al., 2010). Nobiling and Drolet (2012) concluded that "health educators can use social marketing principles to create public awareness of the safety and efficacy of IUDs" (p. 22). An example of a social marketing tool could use a medium such as social media. The ubiquitous medium of social media could be utilized in an innovative marketing tool to help improve contraceptive knowledge among young women.

Recommendations for Systems-Level Changes

Nurse practitioners have the responsibility to effect change at the systems-level of healthcare. This responsibility means that their role extends beyond direct patient care, and includes identifying unmet health needs, making changes in health systems, and ongoing re-evaluation of these changes (CNA, 2016, p.2). It is clear that there is an unmet need to improve contraception in Canada. Specifically, IUDs are an area where improvement should occur. This final section of recommendations focuses on systems-level changes that Nurse Practitioners can make to improve the accessibility of IUDs for all Canadian women.

Reducing the barrier of cost. A major system-wide barrier to IUD use is the upfront and out of pocket cost of each device. Even though this expense is incurred every 3-10 years, and the long-term cost is less than most other contraceptive options, the upfront cost of IUDs is identified as a prohibitive barrier, especially among teens (Eisenberg, McNicholas & Peipert, 2013). The simplest solution to this barrier begins with an improved understanding of the actual

price, as some women may have an inflated perception of cost. Some women may be either unaware of the actual price, or they may not have made a direct comparison between each method. For example, the Mirena, which costs approximately $360 (Island Sexual Health, 2014) can be used for up to 5 years, equating to as little as $6 per month.

Another pragmatic solution to reducing the perception of excessive cost is by improving awareness of extended medical insurance coverage. For example, Studentcare, which provides extended medical benefits for 750 000 Canadian students, will pay for 80% of prescription medication, including IUDs (Student Care, 2017). By improving awareness of this coverage, a student may be more inclined to choose an IUD. Similarly, those covered under the Non-Insured Health Benefits (NIHB) program have 100% coverage for many of their prescription medications including copper and hormone-based IUDs (Government of Canada, 2016). Improving awareness of one's own coverage can enhance IUD uptake among Canadian students, Canadians covered under NIHB, and those covered with extended medical benefits. It is imperative that HCPs understand the nuances of these costs, so they can make recommendations that that are congruent with their patients' financial resources.

A unique initiative similar to BCs QuitNow.ca campaign, which provides publically funded smoking cessation medication for any British Columbian, could offer publically funded contraception for young women. The rationale for the QuitNow program is that by reducing the number of smokers in BC, we can improve the health of our Province's population and decrease the burden on our healthcare system (Bottorff et al., 2016). A publically funded contraception program would follow the same logic. It has been shown that publically funded contraception programs improve IUD rates and reduce unplanned pregnancies (Cook & Fleming, 2010; Secura et al., 2010; Udeh et al., 2009). It would be crucial for this initiative to not focus on only IUDs;

instead, it should provide publically funded contraception of all methods. Reassuringly, it has been shown that by eliminating the personal cost associated contraception, women have a higher tendency to choose IUDs (Secura et al., 2010). An initiative such as this, involving changes in the delivery of pharmaceuticals must include a strong collaborative partnership with pharmacists. Pharmacists are an excellent resource, with a strong understanding of medicine, and their collaboration could act as low barrier access point for women to obtain contraception.

Reducing the barrier of accessibility. Changing how contraception is dispensed can also effect change. For example, reducing barriers associated with multiple visits to the clinic and the pharmacy can improve IUD use (Luchowski et al., 2014). We could achieve this change by encouraging clinics to stock IUDs, eliminating the barrier of having to access a pharmacy and then return to the clinic for insertion. Since multiple visits are associated with low IUD use (Bergin et al. 2012; Stanek et al., 2009), reducing them may further reduce barriers to their use. Assuring that HCPs possess the requisite knowledge and training so that they are not restricting access to IUDs by introducing needless cumbersome investigations would most certainly reduce barriers to their use.

Reducing the barrier of product labeling. As I have discussed, there are inconsistencies in product labeling among various IUD devices (Bayer, 2014a; Bayer, 2014b). Accurate and consistent product labeling is necessary for public and provider information, as it assures that options are properly understood. As agents of change, NPs can take a political and public stance to advocate for accurate product labeling, so the Jaydess and Mirena IUD monographs contain consistent and evidence-based information. Consistent labeling is especially important in Canada, as we move towards introducing a third LNG-IUD, the Kyleena

(Government of Canada, 2017). It is imperative that product labeling is consistent and accurate among all devices.

Changes in three broad areas can affect change by improving access to IUDs in Canada. One main area of focus improves IUD knowledge and skills among HCPs. Additionally, improving public understanding about IUDs and effecting system-level changes will also ensure that these devices remain accessible.

Recommendations for future research.

This recommendation section has been based on the evidence retrieved from the literature using the methods previously described. Undoubtedly some perspectives have been missed. This may be due to gaps in the literature, or it may be from imperfect search methods. In either case, several important perspectives were not identified in the literature, and therefore not yet discussed. This brief section is devoted to presenting these perspectives as areas for future research.

First, it is important that we address the fact that contraception is inherently gendered. As discussed, the only contraceptive method directly used by men are male condoms and vasectomies. Furthermore, the major consequence of unreliable contraception: unplanned pregnancies, are mostly borne by women. Since no literature discussed how this gender bias could act as a barrier to contraception, future research could help fill this gap.

Secondly, we must consider that women of different ages face different obstacles when obtaining contraception. For example, a young teenaged woman may face unique challenges compared to an older woman when seeking contraception. It is paramount that we consider this young subpopulation, as they are highly vulnerable to the burden of unplanned pregnancies. Future research that focuses on teenaged women seeking contraception for the first time would

help identify unique barriers that they face. In considering young women, we must also ask the question: when should contraception education first occur? Is it the role of the school system, the healthcare system; or should it fall on the shoulder of parents to provide this education? Again, it would be valuable to see these questions answered by future research. Since the omnipresence of social media is ever-expanding, it is likely that social media can contribute to contraception education. Research devoted to how social media can be best used to provide this education would also be a valuable contribution to future studies.

Chapter 5: Conclusion

More than 180 000 unplanned pregnancies occur in Canada annually (Black et al., 2015) most of which occur among youth, First Nations, and women of low socio economic class (Aptekman et al., 2014). The burden of unplanned pregnancies is high, resulting in greater maternal and fetal complications, and significant financial strain on the healthcare system (Black et al., 2015). To reduce unplanned pregnancies, women require reliable contraception.

There are many forms of contraception available in Canada each with their pros and cons. Most Canadian women depend on either oral contraception or male condoms (United Nations, 2011), both of which are highly susceptible to typical-use failure (Sundaram et al., 2017). IUDs, on the other hand, are highly effective, safe and reversible; and they are less susceptible to typical-use failure (Polis et al., 2016). Unfortunately, few Canadian women choose this method, especially when compared to other countries (United Nations, 2011), this is despite recommendations by the SOGC that IUDs should be offered as a first-line method of contraception (Black et al., 2016).

The purpose of this literature review was to identify potential barriers that Canadian women face obtaining IUDs, and to make recommendations towards eliminating these barriers. These recommendations are directed towards Family Nurse Practitioners. They were chosen as the focus of these recommendations as they are positioned clinically, politically, and professionally to initiate changes at a clinical, administrative, policy and political level. Despite the focus on FNPs, any healthcare provider, administration, policy maker, or politician would benefit from this discussion as they all play a crucial role in accessible health care to all Canadians.

Peer reviewed data was collected from a thorough literature review of medical, nursing, social science and financial databases. Additionally, discussions from the online blog Reddit, and face to face discussions with HCPs provided informal, yet valuable data on this topic.

The reasons for the underutilization of IUDs in Canada are broad and multifaceted. A collection of barriers that could be contributing to their underutilization was identified. Subsequently, I made a series of recommendations to help eliminate each of these barriers. The barriers to IUDs and the recommendations for each are in Table 7.

Table 7

A Summary of the Findings and Recommendations

Barriers to IUD use	Recommendations for improvement
Poor HCP knowledge about IUDs	Improved awareness through provider education.
Difficult IUD insertions	Improved skill through provider training.
Excessive perception of risk	Improved knowledge of WHO MEC through education
HCPs concern of pain with IUD insertion	Improved pain management techniques, and a better understanding of the pain in can cause
HCP misunderstanding of the MOA	Improved training
Lack of public awareness about IUDS	Public health education campaigns
Lack of public understanding of their MOA, safety, efficacy, and reversibility	Public education and awareness
Personal values that do not align with those which are conducive with the IUD	Not a barrier that needs to be overcome, rather a consideration that needs to be made with informed choice.
Personal cost	Improved awareness of actual long-term cost. Improved awareness of ones extended medical coverage. Public initiatives that could cover contraception – would be cost effective in the long-run.
Confusing labeling of the IUDs	Advocate that the manufacturers have consistent labeling among devices
Multiple office visits	Encourage clinics to stock IUDs to facilitate same-day insertions.

It is my hope that by following these recommendations we can limit the barriers attributed to IUDs, improve the accessibility of reliable contraception for Canadian women, and preventing unplanned pregnancies.

References

Aldona. (2017). All Things Birthcontrol. TwoXChromasomes. Retrieved from https://www.reddit.com/r/birthcontrol/

Andersson, K., Batar, I., & Rybo, G. (1992). Return to fertility after removal of a levonorgestrel-releasing intrauterine device and Nova-T - ScienceDirect, 46(6), 585–584. https://doi.org/https://doi.org/10.1016/0010-7824(92)90122-A

Arrowsmith, M. E., Aicken, C. R., Saxena, S., & Majeed, A. (2012). Strategies for improving the acceptability and acceptance of the copper intrauterine device. The Cochrane Library. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD008896.pub2/abstract

Bayer. (2014a). Jaydess product monograph. Retrieved from http://omr.bayer.ca/omr/online/jaydess-pm-en.pdf

Bayer. (2014b). MIRENA Product Monograph. Retrieved from http://omr.bayer.ca/omr/online/mirena-pm-en.pdf

Bayer. (2016). KYLEENA Product Monograph. Retrieved March 29, 2017, from http://omr.bayer.ca/omr/online/kyleena-pm-en.pdf

Belfield, T. (2010). Words matter! Journal of Family Planning and Reproductive Health Care, 36(2), 55–58. https://doi.org/10.1783/147118910791069484

Bergin, A., Tristan, S., Terplan, M., Gilliam, M. L., & Whitaker, A. K. (2012). A missed opportunity for care: two-visit IUD insertion protocols inhibit placement. *Contraception, 86*(6), 694–697. https://doi.org/10.1016/j.contraception.2012.05.011

Berlan, E. D., Pritt, N. M., & Norris, A. H. (2016). Pediatricians' attitudes and beliefs about long-acting reversible contraceptives influence counseling. *Journal of Pediatric and Adolescent Gynecology*. https://doi.org/10.1016/j.jpag.2016.09.001

Black, A., Guilbert, E., Costescu, D., Dunn, S., Fisher, W., Kives, S., Mansouri, S. (2016). Canadian Contraception Consensus (Part 3 of 4): Chapter 7--Intrauterine Contraception. *Journal of Obstetrics and Gynaecology Canada: JOGC*, *38*(2), 182–222. https://doi.org/10.1016/j.jogc.2015.12.002

Black, A. Y., Guilbert, E., Hassan, F., Chatziheofilou, I., Lowin, J., Jeddi, M., Trussell, J. (2015). The Cost of Unintended Pregnancies in Canada: Estimating Direct Cost, Role of Imperfect Adherence, and the Potential Impact of Increased Use of Long-Acting Reversible Contraceptives. *Journal of Obstetrics and Gynaecology Canada, 37*(12), 1086–1097. https://doi.org/10.1016/S1701-2163(16)30074-3

Black, A., Yang, Q., Wen, S. W., Lalonde, A. B., Guilbert, E., & Fisher, W. (2009). Contraceptive Use Among Canadian Women of Reproductive Age: Results of a National Survey. *Journal of Obstetrics and Gynaecology Canada, 31*(7), 627–640. https://doi.org/10.1016/S1701-2163(16)34242-6

Black, K. I., Lotke, P., Lira, J., Peers, T., & Zite, N. B. (2013). Global survey of healthcare practitioners' beliefs and practices around intrauterine contraceptive method use in nulliparous women. *Contraception, 88*(5), 650–656.

Black, K., Lotke, P., Buhling, K. J., & Zite, N. B. (2012). A review of barriers and myths preventing the more widespread use of intrauterine contraception in nulliparous women. *European Journal of Contraception & Reproductive Health Care, 17*(5), 340–350. https://doi.org/10.3109/13625187.2012.700744

Bogue, D. (1974). Population perspectives: some views from a sociologist. *Population Dynamics Quarterly, 2*(2), 20.

Bottorff, J. L., Oliffe, J. L., Sarbit, G., Sharp, P., Caperchione, C. M., Currie, L. M., Stolp, S. (2016). Evaluation of QuitNow Men: An Online, Men-Centered Smoking Cessation Intervention. *Journal of Medical Internet Research, 18*(4), e83. https://doi.org/10.2196/jmir.5076

Buhling, K. J., Hauck, B., Dermout, S., Ardaens, K., & Marions, L. (2014). Understanding the barriers and myths limiting the use of intrauterine contraception in nulliparous women: results of a survey of European/Canadian healthcare providers. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 183*, 146–154. https://doi.org/10.1016/j.ejogrb.2014.10.020

Burkman, R. (1981). Association between intrauterine device and pelvic inflammatory disease. *Obstetrics & Gynecology, 57*(3), 260–276.

Bushnik, T., Cook, J. L., Yuzpe, A. A., Tough, S., & Collins, J. (2012). Estimating the prevalence of infertility in Canada. *Human Reproduction, 27*(3), 738–746. https://doi.org/10.1093/humrep/der465

Byrne, K. (1990). Medical Records in Litigation: The Dalkon Shield Story. *Health Information Management Journal, 20*(2), 62–65. https://doi.org/https://doi.org/10.1177/183335839002000205

Canada Health Act, Canadian Code 6 § 7 (1984).

Canadian Institute for Health Information (CIHI). (2016). Induced Abortions Reported in Canada in 2015. Retrieved from https://www.cihi.ca/sites/default/files/document/induced-abortion-can-2015-en-web.xlsx

Canadian Nurses Association (CNA). (2009). The Nurse Practitioner Position Statement. Retrieved from http://cna-aiic.ca/~/media/cna/page-content/pdf-fr/ps_nurse_practitioner_e.pdf

CNA. (2016). Canadian Nurse Practitioner Initiative: A 10 Year Retrospective. Retrieved from https://cna-aiic.ca/~/media/cna/page-content/pdf-en/canadian-nurse-practitioner-initiative-a-10-year-retrospective.pdf?la=en

Christian, C. D. (1974). Maternal deaths associated with an intrauterine device. *American Journal of Obstetrics and Gynecology, 119*(4), 441–444. https://doi.org/10.1016/0002-9378(74)90198-7

College of Registered Nurses of British Columbia (CRNBC). (2015). Applying the Competencies Required for Nurse Practitioners in British Columbia. Retrieved from https://www.crnbc.ca/Registration/Lists/RegistrationResources/440PLAR.pdf

CRNBC. (2016). CRNBC Scope of Practice for Nurse Practitioners. Retrieved from https://www.crnbc.ca/Standards/Lists/StandardResources/688ScopeforNPs.pdf

Cook, L., & Fleming, C. (2014). What is the actual cost of providing the intrauterine system for contraception in a UK community sexual and reproductive health setting? *The Journal of Family Planning and Reproductive Health Care, 40*(1), 46–53. https://doi.org/10.1136/jfprhc-2012-100377

Cottingham, J., & Ravindran, S. (2015). Ensuring human rights within contraceptive service delivery: implementation guide. UNPA and World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/10665/158866/1/9789241549103_eng.pdf

da Silva-Filho, A. L., Lira, J., Rocha, A. L. L., & Carneiro, M. M. (2016). Barriers and myths that limit the use of intrauterine contraception in nulliparous women: a survey of Brazilian gynaecologists. *Postgraduate Medical Journal.* https://doi.org/10.1136/postgradmedj-2016-134247

Darroch, J. E., & Singh, S. (2013). Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: an analysis of national surveys. *The Lancet,* 381(9879), 1756–1762. https://doi.org/10.1016/S0140-6736(13)60597-8

Eisenberg, D. L., Schreiber, C. A., Turok, D. K., Teal, S. B., Westhoff, C. L., & Creinin, M. D. (2015). Three-year efficacy and safety of a new 52-mg levonorgestrel-releasing intrauterine system. *Contraception, 92*(1), 10–16. https://doi.org/10.1016/j.contraception.2015.04.006

Eisenberg, D., McNicholas, C., & Peipert, J. F. (2013). Cost as a barrier to long-acting reversible contraceptive (LARC) use in adolescents. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 52*(4 Suppl), S59-63. https://doi.org/10.1016/j.jadohealth.2013.01.012

Finer, L. B., & Henshaw, S. K. (2006). Disparities in Rates of Unintended Pregnancy In the United States, 1994 and 2001. *Perspectives on Sexual and Reproductive Health, 38*(2), 90–96. https://doi.org/10.1363/3809006

Finer, L. B., & Zolna, M. R. (2016). Declines in Unintended Pregnancy in the United States, 2008-2011. *New England Journal of Medicine, 374*, 843–852. https://doi.org/10.1056/NEJMsa1506575

Gariepy, A., Creinin, M. D., Smith, K., & Xu, X. (2014). Probability of pregnancy after sterilization: a comparison of hysteroscopic versus laparoscopic sterilization. *Contraception, 91*(6), 521.

Gipson, J. D., Koenig, M. A., & Hindin, M. J. (2008). The effects of unintended pregnancy on infant, child, and parental health: a review of the literature. *Studies In Family Planning, 39*(1), 18–38.

Glasier, A., Scorer, J., & Bigrigg, A. (2008). Attitudes of women in Scotland to contraception: a qualitative study to explore the acceptability of long-acting methods. *Journal of Family Planning and Reproductive Health Care, 34*(4), 213–217.

Gomez, A. M., Hartofelis, E. C., Finlayson, S., & Clark, J. B. (2015). Do Knowledge and Attitudes Regarding Intrauterine Devices Predict Interest in Their Use? *Women's Health Issues, 25*(4), 359–365.

Government of Canada. (2016). Non-Insured Health Benefits - Drug Benefit List 2016. Retrieved from http://www.healthycanadians.gc.ca/publications/health-system-systeme-sante/nihb-drug-list-2016-liste-medicaments-ssna/index-eng.php?page=28#s11-68

Government of Canada, H. C. (2017). Regulatory decision summary for KYLEENA. Retrieved from http://www.hc-sc.gc.ca/dhp-mps/prodpharma/rds-sdr/drug-med/rds-sdr-kyleena-186786-eng.php

Hall, K. S., Ela, E., Zochowski, M. K., Caldwell, A., Moniz, M., McAndrew, L., Ernst, S. (2016). "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, 93*(6), 556–564. https://doi.org/10.1016/j.contraception.2016.02.007

Hauck, B., & Costescu, D. (2015). Barriers and misperceptions limiting widespread use of intrauterine contraception among Canadian women. *Journal of Obstetrics and Gynaecology Canada, 37*(7), 606–616.

Hubacher, D. (2002). The Checkered History and Bright Future of Intrauterine Contraception In the United States. *Perspectives on Sexual and Reproductive Health, 34*(2), 98–103. https://doi.org/https://doi.org/10.1363/3409802

Island Sexual Health. (2014). Comparing IUDs : Copper, Mirena and Jaydess. Retrieved August 16, 2016, from http://www.islandsexualhealth.org/news/comparing-iuds/

Kaislasuo, J., Heikinheimo, O., Lähteenmäki, P., & Suhonen, S. (2014). Predicting painful or difficult intrauterine device insertion in nulligravid women. *Obstetrics and Gynecology, 124*(2 Pt 1), 345–353. https://doi.org/10.1097/AOG.0000000000000362

Liao, P. V., & Dollin, J. (2012). Half a century of the oral contraceptive pill Historical review and view to the future. *Canadian Family Physician, 58*(12), e757–e760.

Lopez, L., Bernholc, A., Zeng, Y., Allen, R., Bartz, D., & O'Brien, P. (2015). Interventions for pain with intrauterine device insertion. The Cochrane Library. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007373.pub2/full

Luchowski, A. T., Anderson, B. L., Power, M. L., Raglan, G. B., Espey, E., & Schulkin, J. (2014). Obstetrician–Gynecologists and contraception: long-acting reversible contraception practices and education. *Contraception, 89*(6), 578–583.

Mansour, D., Gemzell-Danielsson, K., Inki, P., & Jensen, J. T. (2011). Fertility after discontinuation of contraception: a comprehensive review of the literature. *Contraception, 84*(5), 465–477. https://doi.org/10.1016/j.contraception.2011.04.002

Mohllajee, A., Curtis, K., Morrow, B., & Marchbanks, P. (2007). Pregnancy Intention and Its Relationship to Birth and Maternal outcomes. *Obstetrics & Gynecology, 109*(3), 678–686.

Navarria, I., Julen, O., Narring, F., & Yaron, M. (2015). A new perspective in adolescent contraception--why prescribe an IUD first? *Revue Medicale Suisse, 11*(456–457), 78–81.

Nelson, A., Apter, D., Hauck, B., & Schmelter, T. (2013). Two Low-Dose Levonorgestrel Intrauterine Contraceptive System. *Obstetrics & Gynecology, 122*(6), 1205-12–13.

Nobiling, B., & Drolet, J. C. (2012). Exploring Trends in Intrauterine Device (IUD) Usage among Women in the United States: A Literature Review. *Health Educator, 44*(2), 22–28.

Ohly, T., & Westhoff, C. (2015). Intrauterine Contraception: Comparison of the Copper T Intrauteine Device with the Levonorgestrel Intrauterine Systems. In D. Shoupe & D. Mischell (Eds.), The Handbook of Contraception: A Guide for Practical Management (2nd ed., pp. 166–176). Humana Press.

Okpo, E., Allerton, L., & Brechin, S. (2014). "But you can"t reverse a hysterectomy!' Perceptions of long acting reversible contraception (LARC) among young women aged 16-24 years: a qualitative study. *Public Health, 128*(10), 934–939. https://doi.org/10.1016/j.puhe.2014.08.012

Ortiz, M., & Croxatto, H. (2007). Copper-T intrauterine device and levonorgestrel intrauterine system: biological bases of their mechanism of action. *Contraception, 75*(6), S16–S30. https://doi.org/doi.org/10.1016/j.contraception.2007.01.020

Patil, E., & Jensen, J. (2016). Permanent Contraception for Women. Seminars in Reproductive Medicine. Retrieved from http://europepmc.org/abstract/med/26960907

Polis, C. B., Bradley, S. E. K., Bankole, A., Onda, T., Croft, T., & Singh, S. (2016). Typical-use contraceptive failure rates in 43 countries with Demographic and Health Survey data: summary of a detailed report. Contraception, 94(1), 11–17. https://doi.org/10.1016/j.contraception.2016.03.011

Pritt, N. M., Norris, A. H., & Berlan, E. D. (2016). Barriers and Facilitators to Adolescents' Use of Long-Acting Reversible Contraceptives. *Journal of Pediatric and Adolescent Gynecology.* https://doi.org/10.1016/j.jpag.2016.07.002

Rock, J., Pincus, G., & Garcia, C. (1956). Effects of certain 19-nor steroids on the normal human menstrual cycle. Science, 124(3227), 891–893.

Rubin, S. E., Coy, L. N., Yu, Q., & Muncie, H. L. (2016). Louisiana and Mississippi Family Physicians' Contraception Counseling for Adolescents with a Focus on Intrauterine Contraception. *Journal of Pediatric and Adolescent Gynecology, 29*(5), 458–463. https://doi.org/10.1016/j.jpag.2016.01.126

Rubin, S. E., & Winrob, I. (2010). Urban Female Family Medicine Patients' Perceptions About Intrauterine Contraception. *Journal of Women's Health, 19*(4), 735–740.

Schwarz, E. B., Smith, R., Steinauer, J., Reeves, M. F., & Caughey, A. B. (2008). Measuring the Effects of Unintended Pregnancy on Women's Quality of Life. *Contraception, 78*(3), 204–210. https://doi.org/10.1016/j.contraception.2008.04.120

Secura, G. M., Allsworth, J. E., Madden, T., Mullersman, J. L., & Peipert, J. F. (2010). The Contraceptive CHOICE Project: reducing barriers to long-acting reversible contraception. *American Journal of Obstetrics and Gynecology, 203*(2), 115.e1-7. https://doi.org/10.1016/j.ajog.2010.04.017

Singh, S., Sedgh, G., & Hussain, R. (2010). Unintended Pregnancy: Worldwide Levels, Trends, and Outcomes. *Studies in Family Planning, 41*(4), 241–250. https://doi.org/10.1111/j.1728-4465.2010.00250.x

Stanek, A. M., Bednarek, P. H., Nichols, M. D., Jensen, J. T., & Edelman, A. B. (2009). Barriers associated with the failure to return for intrauterine device insertion following first-trimester abortion. *Contraception, 79*(3), 216–220. https://doi.org/10.1016/j.contraception.2008.09.003

Stewart, M., Digiusto, E., Bateson, D., South, R., & Black, K. I. (2016). Outcomes of intrauterine device insertion training for doctors working in primary care. *Australian Family Physician, 45*(11), 837–841.

Stubbs, E., & Schamp, A. (2008). The evidence is in. Why are IUDs still out? Family physicians' perceptions of risk and indications. *Canadian Family Physician, 54*(4), 560–566.

Student Care. (2017). Your NBCGSS Student Health & Dental Plan. Retrieved from http://studentcare.ca/RTEContent/Document/EN/Brochure/Current_NBCGSS.pdf

Sundaram, A., Vaughan, B., Kost, K., Bankole, A., Finer, L., Singh, S., & Trussell, J. (2017). Contraceptive Failure in the United States: Estimates from the 2006–2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health, 49*(1), 7–16. https://doi.org/10.1363/psrh.12017

Udeh, B., Losech, M., & Spies, E. (2009). The Cost of Unintended Pregnancy in Iowa: A Benefit-Cost Analysis of Public Funded Family Planning Services. The University of Iowa's Institutional Repository. Retrieved from http://ir.uiowa.edu/cgi/viewcontent.cgi?article=1047&context=ppc_health

United Nations. (2011). World Contraceptive Use 2011. Retrieved August 16, 2016, from http://www.un.org/esa/population/publications/contraceptive2011/contraceptive2011.htm

World Health Organization (WHO). (2015). Medical eligibility criteria for contraceptive use (5th ed.). Geneva, Switzerland: WHO Press. Retrieved from http://apps.who.int/iris/bitstream/10665/181468/1/9789241549158_eng.pdf

Yanikkerem, E., Ay, S., & Piro, N. (2013). Planned and unplanned pregnancy: Effects on health practice and depression during pregnancy. *The Journal of Obstetrics and Gynaecology Research., 39*(1), 180–187.

Zildar, V., Upadhyay, U., & Lande, R. (2011). Family Planning: A Global Handbook for Providers. The World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/10665/44028/1/9780978856373_eng.pdf

Appendix 1

Contraindications for the Mirena IUD, adopted from Bayers monograph (Bayer, 2014)

- known or suspected pregnancy
- current or recurrent pelvic inflammatory disease
- lower genital tract infection
- postpartum endometritis
- undiagnosed abnormal uterine bleeding
- uterine anomalies including fibroids if they distort the uterine cavity
- uterine or cervical malignancy
- known or suspected progestin-dependent neoplasia, including breast cancer
- cervicitis
- cervical dysplasia
- active liver disease or dysfunction
- actual benign or malignant liver tumors
- septic abortion within the previous three months
- hypersensitivity to levonorgestrel or any of the other ingredients in the formulation or component of the container components of MIRENA
- bacterial endocarditis
- established immunodeficiency
- acute malignancies affecting blood or leukemias
- recent trophoblastic disease while hCG levels are elevated

Contraindications for the Jaydess IUD, adopted from Bayers monograph (Bayer, 2014)

- Known or suspected pregnancy
- current or recurrent pelvic inflammatory disease or conditions associated with increased risk for pelvic infections
- postpartum endometritis or septic abortion during the previous three months
- abnormal vaginal bleeding of unknown etiology
- uterine anomalies including fibroids if they distort the uterine cavity
- uterine or cervical malignancy
- known or suspected progestogen-dependent neoplasia, including breast cancer
- cervicitis or vaginitis, including bacterial vaginosis or other lower genital tract infections
- until infection is controlled
- cervical dysplasia
- active liver disease or dysfunction
- actual benign or malignant liver tumor
- hypersensitivity to levonorgestrel or any of the other ingredients in the formulation or
- component of the container components of JAYDESS
- a previously inserted intrauterine device (IUD) that has not been removed
- recent trophoblastic disease while hCG levels are elevated

- bacterial endocarditis

Contraindications for the Kyleena IUD, adopted from Bayers monograph (Bayer, 2016)

- known or suspected pregnancy
- current or recurrent pelvic inflammatory disease or conditions associated with increased risk for pelvic infections
- postpartum endometritis or septic abortion during the previous three months
- abnormal uterine bleeding of unknown etiology
- congenital or acquired uterine anomaly, including fibroids, that distort the uterine cavity
- uterine or cervical malignancy
- known or suspected progestogen-dependent neoplasia, including breast cancer
- cervicitis or vaginitis, including bacterial vaginosis or other lower genital tract infections until infection is controlled
- cervical dysplasia
- active liver disease or dysfunction
- actual benign or malignant liver tumours
- hypersensitivity to levonorgestrel or any of the other ingredients in the formulation or component of the container components of a previously inserted intrauterine contraceptive (IUC) that has not been removed
- recent trophoblastic disease while hCG levels are elevated
- bacterial endocarditis

Appendix 2

A Sample of IUD Related comments online from Reddit

Topic	Comment	Author
Cost	"I would like to try an IUD, if I ever have health insurance"	you_stupid_people
Pain for man during intercourse	"My girlfriend has one and it does hurt me, quite a lot. She's had it checked and has been told everything is normal"	Raphael Rodriguez
Insertion pain	"I didn't have any pain killer and I just got it pushed in, I am 16. No kids, and it didnt hurt. I was on my feet within a minute"	Katie_Konnort
	"Insertion is screaming agony. Anyone who tells you otherwise is lying"	No_name
	"I got Mirena the first time 5 years ago. It was agony (I literally cried and screamed, and probably sounded like someone in labor). With that said, I'll be soon setting up the appointment for my replacement. Even knowing how intense the pain was, the five years I had of no periods and no pain (I have endometriosis) and the happy side effect of a better mood... you bet I'll be getting it again."	aldona
	"It didn't help that I read all of the horror stories online about the pain before I went in. Probably only made it worse"	KaylaLittle
	In response to someone asking if an IUD can be removed after 4 weeks of moderate cramping: "It's your choice if you want it removed but honestly, you're not giving it time to adjust to your body."	ChocoboDeath
Accurate info	In response to concerns about IUD perforation "perforation isn't really as scary as it sounds. It is super rare and you heal insanely quickly"	Silly_Willy

Appendix 3

PRISMA checklist adopted from Moher, Liberati, Tetzlaff and Altman (2009)

Title	Identify the report as a systematic review, meta-analysis, or both.
ABSTRACT: Structured summary	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings.
INTRODUCTION	
Rationale	Describe the rationale for the review in the context of what is already known.
Objectives	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).
METHODS	
Protocol and registration	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.
Eligibility criteria	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.
Information sources	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.
Search	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.
Study selection	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).
Data collection process	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.
Risk of bias in individual studies	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.
Summary measures	State the principal summary measures (e.g., risk ratio, difference in means).
Synthesis of results	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.

Appendix 4

Critical Appraisal Skills Program (CASP) Randomized Controlled Trials Checklist. Adapted from Oxman et al., (1994) and Critical Appraisal Skills Programme (2017a).

Section	Question to ask
A: Are the results of the trial valid?	1. Did the trial address a clearly focused issue?
	2. Was the assignment of patients to treatments randomized?
	Is it work continuing: Yes or No?
	3. Were all the patients who entered the trial properly accounted for at its conclusion?
	4. Were patients, health workers and study personnel 'blind' to treatment?
	5. Were the groups similar at the start of the trial?
	6. Aside from the experimental intervention, were the groups treated equally?
B: What are the results?	7. How large was the treatment effect?
	8. How precise was the estimate of the treatment effect?
C: Will the results help locally?	9. Can the results be applied in your context? (or to the local population?)
	10. Were all clinically important outcomes considered?
	11. Are the benefits worth the harms and costs?

Appendix 5

Critical Appraisal Skills Program (CASP) Cohort Study Checklist. Adapted from Oxman et al., (1994) and Critical Appraisal Skills Programme (2017b).

Section	Question to ask
A: Are the results of the trial valid?	1. Did the trial address a clearly focused issue?
	2. Was the cohort recruited in an acceptable way?
	Is it worth continuing: Yes or No?
	3. Was the exposure accurately measured to minimize bias?
	4. Was the outcome accurately measured to minimize bias?
	5. a) have the authors identified all the important confounding factors? b) have they taken account of the confounding factors in the design and/or analysis?
	6. a) Was the follow up of subjects complete enough? b) was the follow up of subjects long enough?
B: What are the results?	7. Wat are the results of this study?
	8. How precise are the results?
	9. Are the results believable?
C: Will the results help locally?	10. Can the results be applied to the local population?
	11. Do the results of this study fit with the over available evidence.
	What are the implications of this study for practice?

Appendix 6

Critical Appraisal Skills Program (CASP) Qualitative Research Checklist. Adapted from Oxman et al., (1994) and Critical Appraisal Skills Programme (2017c).

Section	Question to ask
A: Are the results of the trial valid?	1. Was there a clear statement aiming the research?
	2. Is a quanlitative method appropriate?
	Is it worth continuing: Yes or No?
	3. Was the design appropriate to address the goal?
	4. Was the recruitment strategy appropriate?
	5. Was the data collection in a way that addressed the research issue?
	6. Has the relationship between the researcher and the participants been adequately considered?
B: What are the results?	7. Have ethical issues been taken into consideration?
	8. Was the data analysis sufficiently rigorous?
	9. Is there a clear statement of findings?
	10. How valuable is the research?

Appendix 7

Critical Appraisal Skills Program (CASP) Case Control Study Checklist. Adapted from Oxman et al., (1994) and (Critical Appraisal Skills Programme, 2017d)

Section	Question to ask
A: Are the results of the trial valid?	1. Did the study address a clearly focused issue?
	2. Did the authors use an appropriate method to answer their question?
	Is it worth continuing: Yes or No?
	3. Was the case recruited in an acceptable way?
	4. Were the controls selected in an acceptable way?
	5. Was the exposure accurately measured to minimize bias?
	6. a) What confounding factors have the authors accounted for? 6. b) Have the authors taken account of the potential confounding factors in the design and/or in their analysis?
B: What are the results?	7. What are the results of this study?
	8. How precise are the results?
	9. Do you believe the results
C: Will the results help locally?	10. Can the results be applied to the local population?
	11. Do the results of this study fit with other available evidence?