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The Use of Intrauterine Devices (IUDs) in Adolescents and Nulliparous Women: A Systematic Review

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Abstract

Introduction: High rates of unintended adolescent pregnancy in the United States (US) suggests the need for a highly effective, long acting, reversible contraception method that is safe for nulliparous women and adolescents. The American College of Obstetricians and Gynecologists (ACOG), American Academy of Pediatrics (AAP), and World Health Organization (WHO) have all released statements supporting the use of intrauterine devices (IUDs) as a safe and acceptable means of long acting, reversible contraception for women and adolescents. Despite this support, some health care providers are still resistant to recommend IUDs for use with adolescents and nulliparous women.

Purpose: The purpose of this systematic literature review is to summarize and critically appraise the evidence surrounding the use of IUDs with nulliparous women and adolescents.

Methods: A systematic, retrospective review of the literature pertaining to IUD use in adolescents, young women, and nulliparous women was performed.

Results: The final sample consisted of 12 studies with publication dates from 1996-2014. Overall, IUD use in nulliparous and adolescents was not related to increased rates of uterine perforation, pregnancy, pelvic infections, or infertility. Age and parity was found in some studies to be associated with increased pain with insertion, IUD expulsion, pain after insertion, bleeding, and decreased IUD continuation rates. However, the association between age and parity and these potential IUD related side effects were not significant enough to discredit the use of these devices.

Discussion: It is apparent that the use of IUDs with adolescents and nulliparous women is an effective, safe long-acting reversible contraceptive (LARC) option. Health care providers need to educate their adolescents and nulliparous women patients on the advantages of utilizing IUDs. Further research is warranted on potential prophylactic and symptomatic treatment which may decrease side effects associated with the use of IUDs with adolescents and nulliparous women.

Keywords: Intrauterine devices; Nulliparous women; Adolescents; Long-acting reversible contraceptive (LARC)

Introduction

Primary care providers play an important role in preventing teenage pregnancy. It is believed that primary care efforts focused on educating patients to help prevent unplanned pregnancy has been a contributor to the continued reduction in the annual teenage birth rates in the United States (US) over the past several years. However, despite the decline in the rates, the problem is far from resolved [1]. In 2013, 26.6 babies were born to every 1,000 females under the age of 20 in the US [2]. Of these 750,000 teenage pregnancies, 82% were unplanned.3 Adolescents have the highest rates of unplanned pregnancies compared to any other age group, 82% compared to 49% in women over the age of 18.3 The rate of unplanned pregnancies in adolescents under the age of 15 years of age is even higher at 98% [3].

The concern surrounding adolescent pregnancy is based on the negative relationship found between the age of the mother and the life of the infant. Adolescent pregnancies have been found to result in higher rates of low birth weight infants, still births, preterm labor, mortality within the first year of life, and continued behavioral concerns throughout life for the child [4]. The negative effects of adolescent pregnancy also extends to the mother who faces increased rates of high school dropout, decreased socioeconomic status, and an increased rates of subsequent teenage pregnancy [4]. Adolescent pregnancy also creates an enormous financial burden on society due to increased dependence on public assistance programs and greater public health costs [4].

Despite the high rate of unplanned pregnancies, it is reported that 91% of adolescent mothers did utilize some form of birth control.3 According to American College of Obstetricians and Gynecologists (ACOG) the discrepancy between the number of adolescents who use birth control and the number who become pregnant can be attributed to inconsistent use of contraception methods and selection of methods with high failure rates (primarily due to inconsistent use) such as condoms, oral contraceptives, and coitus interruptus (withdrawal) [5]. In 2007, the ACOG released a committee opinion statement supporting the use of intrauterine devices (IUDs) as a safe and acceptable long-acting reversible contraceptive (LARC) method for women and adolescents [6]. In 2009, the Department of Reproductive Health, World Health Organization released the *Medical Eligibility Criteria for Contraceptive Use (4th ed.)* which supported the use of IUDs in adolescents [7]. In October of 2014, the American Academy of Pediatrics (AAP) released a policy statement encouraging pediatricians to counsel adolescents on contraception by introducing the most effective method, LARCs first [8]. Despite support for the use of IUDs by adolescents by ACOG, the WHO, and the AAP; a study conducted by Tyler et al. in 2012 found that 30% of healthcare providers surveyed still had misconceptions and reservations about the safety of prescribing IUDs for adolescents and nulliparous women [9].

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Purpose

The purpose of this systematic literature review is to summarize and critically appraise the evidence surrounding the use of IUDs by adolescents and nulliparous women.

Background

LARCs effectiveness

Long-acting reversible contraception (LARC) methods, which are over 99% effective, are believed to be a viable option to effectively reduce the number of teenage pregnancies in the US [10]. LARCs include contraception injections (progestin-only Depot medroxyprogesterone acetate), subdermal progestin contraceptive implants (Implanon and Nexplanon), intrauterine devices (IUDs), and intrauterine systems (IUSs) [levonorgestrel releasing (Mirena and Skyla) and copper (ParaGard)] [8,10]. The increased effectiveness of LARCs when compared to short-acting reversible contraception (SARC) methods (condoms, oral contraceptives, Nuva Ring, Patch, cervical caps, and diaphragms) is attributed to the minimal effort needed on the woman's part to obtain perfect compliance [11].

Length of contraceptive coverage

The length of time LARCs are effective depends on the method being used. The progestin-only contraception injection has the shortest length of contraceptive coverage with administration needed every 11-15 weeks [8]. The repeated need for administration with this method should be considered when being used with adolescences due to the high frequency of missed and canceled visits with this population [8]. Subdermal progestin contraceptive implants are inserted into the medial aspect of the upper arm and may remain in place for up to 3 years [12]. The use of subdermal progestin contraceptive implants in adolescences is supported by ACOG [13]. However with the length of contraceptive coverage with an implant being only 3 years, this may be less time than is needed to cover most adolescents' contraceptive needs from the "age-of-sexual initiation to age-of-readiness for parenthood without an unintended pregnancy" as can be accomplished with IUDs (p.s35) [11]. The length of contraceptive coverage with an IUD varies from 3-10 depending on the type of IUD.8 The potential to have 10 years of contraceptive coverage with an IUD makes it ideal coverage to help adolescents reach the "age-of-readiness for parenthood" (p.s35) [11].

Rates of adolescent IUD contraception use

Despite the high efficiency, lack of risk of user error, and long length of contraception coverage, IUDs are not highly utilized by adolescents in the US. According to CDC's *Teenagers in the United States: Sexual Activity, Contraceptive Use, and Childbearing, 2006–2010 National Survey of Family Growth*, the most frequently used contraceptive methods from 2006-2010 were condoms (96%), withdrawal (57%), oral contraceptives (56%), contraception injections (20%), and the contraceptive ring (5.2%) [14]. This survey was conducted during the period following the release of ACOG's 2007 committee opinion statement supporting the use of IUDs for adolescents, yet the survey did not collect data on the rates of IUD use with this population. Finer, Jerman, and Kavanaugh (2012) reported on US trends in LARC and IUD use [15]. The researchers reported that IUD use among adolescents (15–19 years of age) increased from 1.5% to 4.5% from 2007 to 2009. These numbers are low considering ACOG, WHO, and AAP recommend IUDs as the first line contraceptives for adolescents [6-8].

Nulliparous women, adolescents, and IUDs

The term 'nulliparous" refers to women who has never given birth [16]. For the purpose of this paper the term adolescent is used to refer to females under the age of 21 years of age. Much provider hesitation on the use of IUDs with the adolescent population stems from the fact that many are nulliparous. Historically, there has been concern regarding the use of IUDs with nulliparous women due to the need for the IUD to fit through the cervical os, the need for the IUD to remain within the uterine cavity (which may be smaller in adolescents and nulliparous women), the risks of pelvic inflammatory disease, (PID) and infertility risks [17]. The concerns with the use of IUDs with adolescents is associated with the fact that most adolescents also meet the criteria of being a nulliparous woman. Due to the common base of the concern regarding the use of IUDs with adolescents and nulliparous women, for the purpose of this paper research articles which address either population were considered for inclusion in the literature review.

Methods

A systematic review of the literature pertaining to IUD use in adolescents, young women, and nulliparous women was performed. The online search strategy included a review of EBSCOhost, Gale PowerSearch, ProQuest, PubMed Medline, Google Scholar, and reference lists from relevant studies. Search terms included: long-acting reversible contraception, intrauterine devices, intrauterine systems, teenagers, adolescents, and nulliparous women. For the purpose of this systematic review, IUSs were grouped together with IUDs.

In 2009, a systematic review of IUD use with adolescents was performed by Deans and Grimes [18]. The six studies included in the review were dated from 1975-1993.18 Based on the dates of the studies in the Deans and Grimes review, a date range of studies no older than 1993 was selected for inclusion in this review.

Sample

The sample size was determined based on the availability of studies meeting the specific inclusion and exclusion criteria discussed below.

- **Inclusion criteria**

Empirical research studies included in this systematic review of the literature included those which investigated the use of IUDs and IUSs with nulliparous women, adolescents, or young women. Studies which investigated the use of IUDs with participants of all ages and parity, but also specifically broke down results to show findings for adolescent and nulliparous women were included in the review.

- **Exclusion criteria**

Studies focusing on IUD use, but not with nulliparous women, adolescents, or young women were excluded from the review. Systematic reviews, position statements, editorials, and other non-empirical articles were also excluded.

Results

The final sample consisted of 12 studies which investigated the use of intrauterine contraception with adolescents, young women, and/or nulliparous women (Table 1). The dates of the studies ranged from 1996-2014. Based on the *Rating System for the Hierarchy of Evidence*, [19] two studies were level II randomized control studies, [20,21] one was a level III well-designed control trial without randomization, [22] seven were level IV well designed cohort or case-control studies, [23-29] and two were level VI single descriptive studies [30,31]. Sample sizes ranged from 2025 to 2,138. [29]. (Table 1)

Purpose	Nulliparous/ Adolescent	Sample Size	Methodology	IUD Type	Significant Findings	IUD Safe for Nulliparous or Adolescents	Length of Study f/u
To compare the use of IUDs in Nulliparous and Parous women	Nulliparous vs. Parous (ages 16-34)	Nulliparous N = 525 & Parous N = 2770	Non-randomized cohort study	MLCU-250 IUDs (Nulliparous), Tcu-200, 7Cu-200, & Nova-T IUDs (Parous women)	Use of IUD in nulliparous women is of equal benefit as that of parous women. There was no greater risk for complications such as PID and infertility.	Yes	4 years
To determine the risk of infertility among nullipaorus women using IUDs	Nulliparous (590/1895 or 31% of participants were under 24 years of age)	N = 1895, infertile n= 1311, pregnant (control) n= 584	Case control study	Any IUD using copper	Copper IUD is not associated with increased risk of infertility in nulliparous women, but a hx of Chlamydia is	Yes	N/A crossectional - retrospective
To evaluate the clinical performance of three IUDs (TCU 380 Nul, MLCu 375 sl, & TCU 380 A) in Nulliparous mexican women	Nulliparous (median ages for three groups 22.4, 22.6, & 23.2)	Nulliparous N= 1170 (each group had 390)	Single-blind, comparative randomized study	Tcu 380 A (Copper / Control), Tcu 380 Nul (copper but smaller / experimental for nulliparous), ML Cu 375 sl (Hosreshoe shapped copper/ experimental for nulliparous)	Insertion of smaller IUDs (TCU 380 Nul & MLCu 375 sl) less difficulty than the larger TCU 380 A	Yes	1 year
To compare the clinical performance of LNG IUS with Oral Contraceptives (OC) in Nulliparous women	Nulliparous (age 18-25)	Nulliparous = 193, (IUS group n=94, Oral Contraceptives n=99)	Randomized comparative study	Levonorgestrel-releasing (LNG) IUS vs OC	Nulliparous satisfaction with LNG IUS was as good as with OC	Yes	1 year
To investigate the acceptability of LNG-IUS for you nullipaorus Chinease females post surgical abortion	Nulliparous (age 18-25)	Nulliparous N = 20	Prospective observational study	Levonorgestrel-releasing (LNG) IUS	LNG-IUS is an acceptable method of contraception for post abortion, young, nulliparous women. (Limitations: small sample size and low participant retention rate at 1 year f/u)	Yes	1 year (only 45% f/u at 1 year)
To determine the feasibility of a larger study investigating the experience of nulliparous women with IUDs and IUSs	Nulliparous (55% of participants were 24 years of age or younger)	Nulliparous N = 113 (104 with IUD & 9 with IUS)	Prospective pilot study	Levonorgestrel-releasing (LNG) IUS, Nova T Cu 380, T Safe Cu 380 A, GyneFix, & Mulitload Cu 375	IUDs/IUSs are a well tolerated, safe option for nulliparous women with high satisfaction and continuation rates.	Yes	1 year
To investigate the indications for insertion and removal of the LNG IUD in New Zealand adolescents	Adolescents (ages 11-19)	Adolescent N = 133 (completed study)	Prospective observational cohort study	Levonorgestrel-containing IUD	LNG IUD was most frequently started in adolescents due to 85% continuation rate in adolescents with LNG IUD	Yes	1 year
To evaluate the rate and type of complications assocuated with the Copper T 380A IUD between adult women and adolescent women in Egypt	Adolescents (defined as 13-19 years of age) compared to adults (20 and older)	Total N = 852, Adolescents n = 281 and Adult women n = 571	Prospective comparative study	Copper T 380A IUD	The rates of pain, bleeding, displacement, expulsion, and early removal of IUDs were significantly higher in adolescent women	Yes with close monitoring	6 months
To investigate the use of IUDs, including side effects and compliance, in adolescents and young women	Adolescents and Young Women (16-22 years of age)	Adolescents N = 89 (only 5.6% were nulliparous)	Descriptive, retrospective chart review	Copper (13% of participants) and Levonorgestrel-containing (87 % of participants)IUDs	IUDs are a reliable method of contraception in young women and adolescents. There were fewer removals of the LNG devices due to side effects & there were no pregnancies with the LNG. Findings were not significantly different enough to recommend one device over the other.	Yes	3 years
To investigate the use of LNG IUS in nulliparous women	Nulliparous (50% were also adolescents)	Nulliparous N = 224, (Under 20 and nulliparous n=114)	Non-interventional cohort study	Levonorgestrel-containing IUS (Mirena)	Altough there was pain with insertion, it was effective contraception with high satisfaction and continuation rates (Note - results do not clearly show results of women under 20 vs other age groups for each side effect. Also high lack of follow up with participants beyond 2nd f/u)	Yes	3 follow up (f/u) sessions. 3rd f/u ranged from 30-124 weeks post insertion) However, only 62% were available for follow the 3rd f/u

To investigate the use of IUDs in adolescents and young women	Adolescents and Young Women (<21 years of age)	N=233, Under 18 years n=69, 18-21 n=164 (Nulliparous n= 71, Parous n= 164)	Retrospective descriptive study	CuT380A IUD (Paraguard), and Levonorgestrel-containing IUS (Mirena)	Age was not significant in expulsion while Nulliparous status was, for early termination age was significant while nulliparous status was not. However rates of continuation were still longer than other hormonal contraceptives (oral).	Yes	8 years
To analyze the effects of age, parity, and IUD type on rates of complications.	Nulliparous & Adolescent	N=2138, Adolscent n= 249, Nulliparous n= 273	Chart Review	Levonorgestrel-releasing, Copper	No difference in IUD use in adolescents, nulliparous, and parous adults	Yes	1 year

Table 1: Studies Investigating IUDs in Adolescents and Nulliparous Women 1996-2014.

The articles included in the sample were reviewed for findings specific to pain with insertion, uterine perforation, expulsion, pregnancy, bleeding, pain after insertion, pelvic infection (including PID), infertility, and continuation rates. Table 2 provides a summary of the findings discussed below (Table 2).

Pain with insertion

Three of the twelve studies addressed pain with insertion of the IUD. The majority of participants reported pain with insertion at a moderate level. [20,28] Brockmeyer, Kishen, and Webb (2008), reported that 33% of nulliparous women found the procedure to be "less painful" than expected, 45% described it to be the "expected level of pain," and 19% found the procedure to be "more painful than expected." [26] One nulliparous woman in the study reported:

Sharp pain at fitting, only later period like…but this should be advertised more for women who have not had any children. I would have had this a long time ago if I had known. I firmly believe that women who have not had any children could not have an IUD fitted. I became aware of this when a colleague who had no children had an IUD fitted (p. 251). [26]

Uterine perforation

Only one study reported any uterine perforations associated with the use of IUDs. Aoun, et al. (2014) which investigated the effects of parity and age on IUD use found that three parous women in the 20-

Year	Author(s)	Pain with insertion	Perforation	Expulsion	Pregnancy	Bleeding	Pain (after insertion)	PID or Pelvic Infection	Infertility	Continuation Rates
1996	Duenas, et al.	XX	None reported	25/525 or 4% of nulliparous women	18/525 or 3% of nulliparous women had IUD removed due to becoming pregnant	12/525 or 2% of nulliparous women d/c IUD early due to bleeding/ pain	12/525 or 2% of nulliparous women d/c IUD early due to bleeding/ pain	None reported	None reported	Similar length of use reported between nulliparous and parous women
2001	Hubacher, et al.	XX	XX	XX	XX	XX	XX	XX	IUD with copper doesn't increase risk of infertillity in nulliparous women	XX
2003	Otero-Flores, et al.	XX	None reported	Sig less (p<0.001) with smaller IUDs (TCU 380 Nul & MLCu 375 sl)	TCU 380 A - 4/390 pregnancies (1%), TCU380 Nul - 2/390 pregnancies (0.5%)	Sig less (p<0.001) with with smaller IUDs (TCU 380 Nul & MLCu 375 sl)	Sig less (p<0.001) with with smaller IUDs (TCU 380 Nul & MLCu 375 sl)	None reported	XX	Sig longer use (p<0.001) with with smaller IUDs (TCU 380 Nul & MLCu 375 sl)
2004	Suhonen, et al.	64.9% nulliparous young women reported mild to moderate pain, 21.3% reported severe pain with insertion	None reported	1/94 <1% expulsion	None reported	2/94 or 2% terminated IUD due to bleeding	6/94 or 6% terminated IUD due to pain	None reported	XX	At 12 months 19 LNG IUS vs. 27 OC women terminated use of contraceptive
2004	Li, et al	XX	XX	XX	XX	Rates of irregular bleeding decreased as length of time with IUD increased 50% (at 6weeks), 33% (3 months), 8% (6 months)	1 participant requested removal due to pain	1/13 had pelvic infection at 6 months (did not clarify if PID)	XX	4/18 requested removal. However at 1 year follow up the 9 subjects which were able to be contacted reported 100% acceptability of IUD

2008	Brockmeyer, et al.	33% of nulliparous women said the procedure was "less painful" than expected, 45% found it "expected level of pain, " and 19% found the procedure to be "more painful than expected"	None reported	7% had expulsions at 1 year	None reported	47% had heavy periods that they could cope with, 5% had heavy bleeding that they could not cope with	59% of women reported pain at 1 year	1% had suspected PID	XX	At 1 year 44% of had device removed (mostly due to pain & bleeding)
2009	Paterson, et al.	XX	None reported	11 out of 133 expulsions or 8%. Authors note this is consistent with rates reported by Mirena for the general user	None reported	XX	XX	1/133 PID <1%	XX	1 year continuation rate of 85%
2011	Rasheed, et al.	XX	XX	Significantly higher rates of expulsions and displacement in adolescents compared to adults	None reported	At 3 months, significantly higher rates of bleeding in adolescents (55) compared to adults (37) p<0.05. After 3 months no longer a statisticially signigicant difference	At 3 months, significantly higher rates of pain in adolescents (42) compared to adults (21) p<0.05. After 3 months no longer a statisticially signigicant difference	2/244 or 0.8% PID (adolescent group). None in adults.	XX	Significantly higher rates of early termination rates in adolescents (105) compared to adults (60) (p<0.05)
2011	Lara-Torre, et al.	XX	XX	3% expulsions	2% pregnancy with copper IUD & none with LNG	32% experienced bleeding	28% experienced pain	9% infections but no PID	XX	Fewer removals due to side effects in the LNG group (22%) compared to the Copper device group (41.7%)
2011	Marions, et al.	In the women under the age of 20, 19% reported severe pain and 71% reported moderate pain with insertion	None reported	2nd f/u (12-16 weeks) 4/224 or 1.8% expulsions	None reported	XX	XX	1st f/u (2-5 weeks) 6 women had signs of infection (no reported PID)	XX	84% continuation rate at 2nd f/u (12-16 weeks)
2012	Alton, et al.	10/233 were placed under anestesia, no reports on patient pain reporting	None reported	Expolusion risk was greater in nulliparous women (p=0.017), age was not found to be significant (p=0.22)	None reported	XX	XX	7.7% infection rate. Nulliparous (RR=5.60) was significantly higher (p<0.001). Prior STI (RR=5.48) significant (p<0.001). Age not significant (p=0.11).	XX	< 18 yo increased rates of early termination. Nulliparous status was not found to be significant
2014	Aoun, et al.	XX	3/2,138 or 0.14% perforation rate over all (Note: all perforations occurred in participants in the 20-24 group)	6% expulsion rate, no diff in rates between nulliparous and parous women. Higher in copper IUD users vs LNG	1% pregnancy rate, no diff in rates between nulliparous and parous women	30% reported abnormal bleeding	Over all 29% reported pain. Ages 13-19 (38%), more likely to report having pain compared to 20-24 (32%), and 25-35 (32%) p<0.001	Overall findings 23% vaginitis, 6% cervicitis, and 2% PID	XX	Parity not significant. Termination rates adolescents > women over 20

24 age group experienced perforations. No perforations occurred in adolescent or nulliparous women [29].

Expulsion

Ten of the studies included in the sample reported expulsion rates for participants. Expulsion rates ranged from <1% to 8% [20,27] Findings based on age and parous status were not consistent. Rasheed and Abdelmonem, (2011), found adolescents (2.9% 1 month and 9.8% 3 months) had significantly (p<0.001) higher rates of expulsions and displacements compared to adults (0.2% 1 month and 2.2% 3 months) [22] Alton, et al. (2012), reported the expulsion risk was greater in nulliparous women (p=0.017), while age was not found to be significant (p=0.22) [31] Aoun, et al. (2014), found no difference in expulsion rates between women based on parity, however did report higher expulsion rates with copper IUDs (2% at 1 month, 6% at 12 months, and 8% at 37 months) compared to LNG IUDs (1% at 1 month, 3% at 12 months, and 5% at 37 months).29 Otero-Flores, Guerrero-Carreño, and Vázquez-Estrada (2003), reported smaller IUDs TCu 380 Nul (1.8%) and ML Cu 375 sl (1.8%) which were trialed with nulliparous women had significantly lower (p<0.001) rates of expulsion when compared to TCu 380A (3.3%). [21]

Pregnancy

Four of the twelve studies reported the occurrence of pregnancies despite IUD use [21,23,29,30]. Pregnancy rates with IUD use ranged from 0.5%21 to 3%.23 Aoun, et al. (2014), reported a 1% pregnancy rate with no significant difference between nulliparous and parous women [29]. Lara-Torre, Spotswood, Correia, and Weiss (2011), described pregnancy was more frequent (2%) in nulliparous adolescents with copper IUDs compared to nulliparous adolescents with LNG IUDs (0 occurrences) [30].

Bleeding

The majority of the studies, eight out of twelve, reported finding heavy and / or irregular bleeding to be a common side effect of IUD use with the nulliparous and adolescent population [20-23,25-26,29-30]. Despite these findings, based on the studies in this sample alone, it is difficult to determine if the rates of heavy and / or irregular bleeding are related to age and parity, or merely the use of an IUD in general. Aoun, et al. (2014), investigated the effects of age on IUD use and complications [29]. The study revealed that 30% of the total participants experienced abnormal bleeding. The frequency of abnormal bleeding between participants aged 13-19 (35%), 20-24 (30%), and 25-35 (29%), showed a decreasing trend in bleeding as age increased, which was not found to be statistically significant (p = 0.20) [29] Rasheed and Abdelmonem (2011), did identify a statistically significant (p=0.034 at 1 month and p=0.030 at 3 months) increase in bleeding among adolescents (35.2% at 1 month and 37.2% at 3 months) compared to adults (23.9% at 1 month and 25.1% at 3 months) [22]. At the 6 month follow up, there was no longer a statistical difference (p=0.230) in the rates of bleeding between adolescents (54.2%) and adults (45.9%) [22].

Pain after insertion

Pain after IUD placement was a common finding among the sample studies. Reports of pain were still present even at 1 year follow up [20,21,23,26,29-30]. Two studies reported higher rates of pain in adolescents. Rasheed and Abdelmonem (2011), reported a statistically significant (p=0.015 at 1 month and p=0.004 at 3 months) reporting of pain among adolescents (56.9% at 1 month and 28.4% at 3 months) compared to adults (23.9% at 1 month and 25.1% at 3 months) [22]. After three months there was no longer a statistical difference in the rates of pain between adolescents and adults [22]. 29% of participants in a second study reported significant (p<0.001) higher rates in the participants in the youngest age group, 13-19 (38%) compared to those age 20-24 (32%), and 25-35 (32%) [29].

Pelvic inflammatory disease (PID) or pelvic infection / Infertility

Both parity and history of sexually transmitted infection (STI) were described to be significant factors in infections related to IUD use [31]. The relative risk for nulliparous (RR=5.60) was significantly higher (p<0.001) than multiparous women. Additionally, history of a prior STI (RR=5.48) was also found to be statistically significant (p<0.001) [31]. Age was not found to be significant (p=0.11) [31]. Six other studies reported pelvic infections ranging from vaginitis, cervicitis, to PID; however no correlations were made between age or parity [25-29,30]. Only one study investigated IUDs risk of infertility on nulliparous women [24]. It was concluded that the use of an IUDs did not increase the risk of infertility in nulliparous women, however a history of an infection with Chlamydia trachomatis did [24].

Continuation rates

Three studies found IUD removal rates to be greater in adolescents compared to older women [22,29,31] Rasheed and Abdelmonem (2011), found adolescents' rates of early removal of IUD at 1 month (20.1%) to be statistically higher (p=0.001) than adults (5.6%). There were no significant difference in rates noted at the 3 (p=0.120) and 6 month (p=0.690) follow ups [22] Alton, et al. (2012), compared IUD rates of early removal between adolescents <18 to women >18 to 21.31 Adolescents <18 (19% at 6 months, 30% at 1 year, and 50% at 5 years) were found to have significantly higher (p<0.001) rates of early IUD removal compared to women >18 to 21 years of age (6% at 6 months, 11% at 1 year, and 28.5% at 5 years) [31]. IUD retention rates were not found to be different between nulliparous and multiparous women [23,29,31] On initial review of study findings, Alton, et al., found nulliparous to have higher rates of early IUD removal rates, however once age was controlled as a confounder, parity was found not to be significant (p=0.132) [31].

Discussion

The US has some of the lowest rates of IUD use in the world, part of which is due to health care providers misconceptions regarding IUD use particularly in nulliparous women.9 Fear of inserting IUDs in adolescent and nulliparous women may be based the relative size of the uterine cavity, the ease of cervical dilatation in multiparous women is greater than in nulliparous women, and the fear of infection such as PID that may lead to infertility [9,17,22,24] Based on the understanding of these plausible concerns, and the lack of existence of studies focused solely on the use of IUDs with adolescents, this systematic review looked specifically at empirical studies which investigated the use of IUDs in nulliparous and adolescent women. Based on this criteria 12 studies were found for inclusion. All of the studies included in this sample support the positions put forth by ACOG, the AAP, and WHO regarding the use of IUDs in adolescents. Overall, IUD use in nulliparous women and adolescents was not found to have increased rates of uterine perforation, pregnancy, pelvic infections, or infertility. Age and parity was found in some studies to be associated with increased pain with insertion, IUD expulsion, pain after insertion, bleeding, and decreased IUD continuation rates. However, the association between age and parity and these potential IUD related side effects were not significant enough to discredit the use of these devices. Additionally, more research is warranted to identify potential means of decreasing the

occurrence of these side effects with this population rather than failing to use a highly effective long term reversible contraceptive method with a population which can benefit so greatly from such protection.

Prophylaxis and symptomatic treatment may be the key to improving the use of IUDs with adolescents and nulliparous women. Research is already being conducted regarding means of decreasing pain with IUD insertion. The use of sublingual misoprostol to prime the cervix prior to insertion of the IUD may be a potential means to ease the insertion of IUDs [32]. There may also be potential for research surrounding IUDs that decrease rates of expulsion in adolescents and nulliparous women. The study included in this review by Otero-Flores, Guerrero-Carreño, and Vázquez-Estrada (2003), found smaller IUDs TCu 380 Nul and ML Cu 375 sl which were trialed with nulliparous women had significantly lower rates of expulsion, pain after insertion, and bleeding when compared to TCu 380A [21]. These two trial IUDs for nulliparous women, TCu 380 Nul and ML Cu 375 sl, are not available currently in the US. However, additional studies surrounding smaller devices such as these may be a potential solution for higher rates of uterine expulsion associated with traditional IUDs in adolescent and nulliparous women. IUD continuation rates are lower in adolescents when compared to older women [22,29,31]. However, the rates of adolescent continuation or consistency with any contraceptive method may also vary from that of adults. Suhonen, Haukkamaa, Jakobsson, and Rauramo (2004) found young, nulliparous women's continuation and satisfaction rates with IUDs were higher than those using oral contraceptives [20].

It is apparent that the use of IUDs with adolescents and nulliparous is an effective, safe an at risk population who should be encouraged to opt for LARCs such as IUDs. Despite the benefits of IUDs for adolescents, knowledge regarding the contraception method is not adequately being disseminated to the adolescent population. In a study which surveyed adolescent girls' ages 14-19, only 21% had heard of an IUD as a potential contraception method. [33]. Health care providers need to educate both themselves and their patients on the advantages of utilizing IUDs with adolescents and nulliparous women, and potential steps that can be taken to decrease any adverse effects.

References

1. Breaking the cycle of teen pregnancy (2013) Centers for Disease Control and Prevention (CDC).
2. Ventura S, Hamilton D, Mathews T (2014) National and State Patterns of Teen Births in the United States, 1940-2013. National Vital Statistics System: 63.
3. Unintended pregnancy prevention (2013) Centers for Disease Control and Prevention (CDC).
4. Negative impacts of teen childbearing (2014) Office of Adolescent Health (OAH).
5. American College of Obstetricians and Gynecologists (ACOG) (2012) ACOG Committee. Adolescents and long-acting reversible contraception: Implants and intrauterine devices.
6. American College of Obstetricians and Gynecologists (ACOG) (2007) ACOG Committee. Intrauterine device and adolescents. Obstet Gynecol 110: 1493-1495.
7. Department of Reproductive Health, World Health Organization (WHO) (2010) Medical *Eligibility Criteria for Contraceptive Use* Geneva: WHO.
8. American Academy of Pediatrics (2014) Policy statement: Contraception for adolescents. Pediatr 134: e1244-e1255.
9. Tyler C, Whiteman M, Zapata L, Curtis K, Hillis S, et al. (2012) Health care provider attitudes and practices related to intrauterine devices for nulliparous women. Obstet Gynecol 119: 762-771.
10. Long-acting reversible contraception (LARC) (2014). Family Planning Association (FPA).
11. Teal S, Romer E (2013) Awareness of long-acting reversible contraception among teens and young adults. J Adolesc Health 52: S35-S39.
12. Hatcher R, Trussell J, Nelson A, Cates W, Kowai D (2012) Contraceptive Technology, New York Ardent Media Inc.
13. American College of Obstetricians and Gynecologists (ACOG) (2011). ACOG Practice Bulletin No. 121, July: Long-acting reversible contraception: Implants and intrauterine devices.
14. Teenagers in the United States: Sexual Activity, Contraceptive Use, and Childbearing, 2006–2010 National Survey of Family Growth (2011). Hyattsville, Maryland: US Department of Health and Human Services Centers for Disease Control and Prevention National Center for Health Statistics.
15. Finer L, Jerman J, Kavanaugh M (2012) Changes in use of long-acting contraceptive methods in the US, 2007–2009. Fertil Steril 98: 893-897.
16. Chenery-Morris S, McLean M (2013) Normal Midwifery Practice, Thousand Oakes, CA, SAGE Publications Inc.
17. Prager S, Darney P (2007) The levonorgestrel intrauterine system in nulliparous women. Contraception 5: s12-s15.
18. Deans E, Grimes D (2009) Intrauterine devices for adolescents: a systematic review. Contraception 2009; 79: 418-423.
19. Melnyk B, Fineout Overholt E (2011) Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice, Philadelphia, PA, Lippincott, Williams, & Wilkins.
20. Suhonen S, Haukkamaa M, Jakobsson T, Rauramo I (2004) Clinical performance of a levonorgestrel-releasing intrauterine system and oral contraceptives in young nulliparous women: a comparative study. Contraception 69: 407-412.
21. Otero Flores J, Guerrero Carreño F, Vázquez Estrada L (2003) A comparative randomized study of three different IUDs in nulliparous Mexican women. Contraception 67: 273-276.
22. Rasheed S, Abdelmonem A (2011) Complications among adolescents using copper intrauterine contraceptive devices. International Journal of Gynecology and Obstetrics 115: 269-272.
23. Dueñas J, Albert A, Carrasco F (1996) Intrauterine contraception in nulligravid vs parous women. Contraception 53: 23-24.
24. Hubacher D, Lara Ricalde R, Taylor D, Guerra Infante F, Guzmán Rodríguez R (2001) Use of copper intrauterine devices and the risk of tubal infertility among nulligravid women. N Engl J Med 345: 561-567.
25. Li C, Lee S, Pun T (2004) A pilot study on the acceptability of levonorgestrel-releasing intrauterine device by young, single, nulliparous Chinese females following surgical abortion. Contraception 69: 247-250.
26. Brockmeyer A, Kishen M, Webb A (2008) Experience of IUD/IUS insertions and clinical performance in nulliparous women-a pilot study. European Journal of Contraception & Reproductive Health Care 13: 248-254.
27. Paterson H, Ashton J, Harrison Wollrych M (2009) A nationwide cohort study of the use of the levonorgestrel intrauterine device in New Zealand adolescents. Contraception 79: 433-438.
28. Marions L, Lövkvist L, Taube A, Johansson M, Dalvik H, et al. (2011) Use of the levonorgestrel releasing-intrauterine system in nulliparous women a non-interventional study in Sweden. European Journal of Contraception & Reproductive Health Care 16: 126-134.
29. Aoun J, Dines V, Stovall D, Mete M, Nelson C (2014) Effects of age, parity, and device type on complications and discontinuation of intrauterine devices. Obstet Gynecol 123: 585-592.
30. Lara Torre E, Spotswood L, Correia N, Weiss P (2011) Intrauterine contraception in adolescents and young women: A descriptive study of use, side effects, and compliance. J Pediatr Adolesc Gynecol 24: 39-41.
31. Alton T, Brock G, Yang D, Wilking D, Hertweck S, et al. (2012) Retrospective review of intrauterine device in adolescent and young women. J Pediatr Adolesc Gynecol 25: 195-200.
32. Saav I, Aronsson A, Marions L, Stephansson O, Gemezell Danielson K (2007) Cervical priming with sublingual misoprostol prior to insertion of an intrauterine device in nulliparous women: A randomized control trial. Hum Reprod 22: 2647-2652.
33. Barrett M, Soon R, Whitaker A, Takekawa S, Kaneshiro B (2012) Awareness and Knowledge of the Intrauterine Device in Adolescents. J Pediatr Adolesc Gynecol 25: 39-42.