Original Study

International Perspectives: IUDs and Adolescents

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A B S T R A C T

Unplanned or unwanted pregnancy among adolescents is a worldwide public health issue. In many countries unmarried young women are denied contraceptive services. Long-acting reversible contraceptive methods such as the intrauterine devices (IUDs) have been shown to be more effective than short-acting such as the pill, and safe also for adolescents. The popularity has varied a lot with time and between populations. Health care providers, health system, and user factors all influence IUD use. A good sexuality education through school provides a foundation, and health care providers give specific individual counseling. International and country-specific guidelines have been published during the past decade indicating the advantage of IUDs. New smaller size devices make placement easier for nulliparous adolescents. Still the uptake has remained rather low in most regions, cost being one barrier. Several municipalities have started to provide long-acting reversible contraceptive methods for adolescents free of charge, and this has led to a significant increase in IUD use, accompanied by a reduction in abortion rates. Adolescent-friendly services should offer low-cost or free contraception, including male and female condoms, emergency contraception, and a full range of modern methods, including long-acting reversible methods, according to adolescents' preferences and needs.

Key Words: Intrauterine contraception, LARC, Adolescent contraception, Guidelines, Sexual health

Introduction

Unplanned or unwanted pregnancy among adolescents is a worldwide public health issue. The sustainable development goals and the Global Strategy for Women's, Children's And Adolescents' Health 2016-2030 have placed renewed emphasis on the sexual health needs of adolescents.[1] Although they are the largest cohort of adolescents in history, their diverse contraceptive needs have not been properly addressed. This is particularly true for unmarried adolescents. There is a large and growing need especially in developing countries for effective contraception in general and for long-acting methods in particular. Approximately 21 million 15- to 19-year-old girls in developing countries become pregnant every year, and approximately half of these pregnancies are unintended.[2]

Adolescent pregnancies have been shown to result in higher rates of low birth weight infants, still births, preterm labor, mortality within the first year of life, and behavioral concerns for the child. The negative effects of adolescent pregnancy also concerns the mother with increased rates of high school dropout, decreased socioeconomic status, and an increased rates of subsequent teenage pregnancy.[3] Adolescent pregnancy also creates an enormous financial burden on society because of increased dependence on public assistance programs and greater public health costs.

Sexuality education plays an essential role in improving adolescent sexual health. It is important to note what works and what does not work in various settings.[4] Sexuality education needs to be well planned and age-adapted; the framework "Standards for sexuality education in Europe" provides a good basis.[5] Sexuality education is best planned and organized through school to obtain national coverage[6] and is then cost-effective. Health care providers give specific individual counselling.[7]

Contraception for adolescents has traditionally been listed as: (1) condom and emergency contraception; (2) hormonal contraceptives and condom; and (3) hormonal contraceptives.[8] In recent years, long-acting reversible contraception (LARC) methods have been promoted for obvious reasons being much more effective—more than 99% effective. Views on adolescent use of intrauterine contraception has changed during the past 10 years. US-based organizations have been strong advocates for LARC, and most published studies are also from the United States, as this special issue on intrauterine devices (IUDs) and adolescents will show. The term, IUD, in this article is used for all intrauterine contraception. The American College of Obstetricians and Gynecologists updated its committee opinion in 2018 to include that IUDs are safe for adolescents and that patient choice should be the driving factor.[9] In 2014, the American Academy of Pediatrics released a policy statement encouraging pediatricians to counsel adolescents on contraception by introducing the most effective method, LARCs, first.[10]

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Guidelines

The World Health Organization (WHO) published the first edition of Medical Eligibility Criteria (MEC; Table 1) for contraceptive use in 1996, and the most recent fifth edition in 2015.[11] Several tools and job aids are available from the WHO and other sources to help providers use these recommendations in practice. The WHO MEC has provided the basis for many regional and national guidelines.

For use of the copper IUD (CU-IUD) and levonorgestrel-releasing intrauterine systems (LNG-IUS) in relation to age, the WHO fifth edition still has MEC 2 for menarche to younger than 20 years of age, considering limited evidence at the time of review for use by adolescents younger than 20 years of age, and MEC 1 for those 20 years of age and older. The WHO MEC stated that risks of pregnancy, infection, and perforation are low among IUD users of any age. Heavy bleeding or removals for bleeding do not seem to be associated with age.

The WHO MEC still marks 2 for nulliparous women, and 1 for parous women. However, the WHO stated that risks of pregnancy, infection, perforation, and expulsion are low among all IUD users, and differences according to parity might not be clinically meaningful.

The United Kingdom Faculty of Sexual and Reproductive Healthcare (FSRH) has produced several good guidelines. The United Kingdom Medical Eligibility for Contraceptive Use[12] still has MEC 2 for menarche to younger than 20 years of age, and MEC 1 for 20 years of age or older or use of CU-IUD and LNG-IUS. However, for nulliparous women, the United Kingdom MEC has now changed to 1 for IUD. Useful additional advice is provided with the method-specific FSRH Clinical Guidance, “Intrauterine Contraception.”[13]

Because the CU-IUD is effective immediately after insertion it can be inserted at any time in the menstrual cycle if it is reasonably certain the woman is not pregnant.[13] In a systematic review the effect of inserting an IUD on different days of the menstrual cycle was examined, and reasonable-quality evidence was reported that timing of insertion of a CU-IUD did not have a significant effect on longer-term or short-term outcomes such as continuation, pregnancy rates, expulsion, and bleeding or pain at insertion.[14] There is therefore no need to only insert IUDs during menses, providing the risk of pregnancy can be appropriately excluded.

There are insufficient data to indicate precisely how soon after insertion of the LNG-IUS contraceptive protection is established. Advice from the FSRH and the WHO is consistent with that of the summary of product characteristics, stating that the LNG-IUS can be inserted up to day 7 without the need for additional contraception. If an LNG-IUS is inserted later in the cycle additional contraceptive precautions are required for 7 days.[13] An LNG-IUS can be inserted any time in the menstrual cycle if it is reasonably certain the woman is not pregnant or at risk of pregnancy (outside the terms of the product license). The LNG-IUS should not be used for emergency contraception because unlike the CU-IUD there is no evidence to show efficacy.

As indicated in Table 2, several European countries or societies have updated their guidelines or recommendations regarding IUD use by adolescents in recent years. The obstetric and gynecologic societies of Norway, Denmark, Finland, France, Italy, Belgium, and several others suggest IUDs for adolescents and nulliparous women. LARCs are endorsed as first-line contraceptives also for Canadian youth. No age group restrictions apply in South Africa.

Table 1
Medical Elegibility Criteria Categories.

Category	Description
1	A condition for which there is no restriction for the use of the contraceptive method
2	A condition for which the advantages of using the method generally outweigh the theoretical or proven risks
3	A condition for which the theoretical or proven risks usually outweigh the advantages of using the method
4	A condition that represents an unacceptable health risk if the contraceptive method is used

Adapted from World Health Organization.[11]

Extent of Use

It is quite difficult to find reliable data on the extent of IUD use among adolescents in various regions and countries. Some studies or national registers do not provide age-specific data, others group all LARC methods together, or provide data only on prescription-based methods such as the LNG-IUS and not CU-IUD.

An example of the latter is the recent quite unique study regarding Sweden, Norway, and Denmark, having national registers for redeemed prescriptions of hormonal contraceptives. During the studied period, 2008-2015, the use of LARC increased among 15- to 19-year-old adolescents, together with decreases of abortions and deliveries among the same age group (Fig. 1A).[15] In Norway, the main LARC method was the implant, and in Sweden the LNG-IUS, up to 8% in the 18- to 19-year-old group (Fig. 1C). The percentages are in relation to the whole female age group, not only sexually active. Thus there are huge differences between 18- to 19-year-old girls compared with 15- to 17-year-old girls.

In a survey among 359 women aged 16-23 years visiting a free sexual health clinic and 140 general practitioners in Oslo, Norway, 82% were current contraceptive users and of this group, 34/284 (12%) were LARC users.[16] Combined oral contraceptives (56%) and condoms (20%) were the methods most commonly used. The women considered themselves as having insufficient knowledge about LARCs. Knowledge was an independent predictor of current LARC use. Among providers, the main determinant for not mentioning intrauterine contraception during counseling was nulliparity. Thus, dispelling misconceptions and improving provider training could encourage LARC use.

Method-specific contraceptive prevalence varies widely across the world. The United Nations Population Division report, World Contraceptive Use 2018,[17] provides some data on contraceptive prevalence, of very variable sources and reliability. For many countries, data collection is restricted to married women, largely excluding adolescents. In many countries as well, unmarried adolescents are still also excluded from contraceptive services. In 2015, of married or in-union women 14% used the IUD according to the United Nations report. Short-term methods were less common: 9% of women used the pill in 2015, 8% relied on male condoms,

Table 2
Some Examples of Guidelines/Recommendations Regarding LARC in Various European Countries

Country	Guideline/recommendations Available?	If yes, year of Last Update	If yes, Issued by (eg, Gynecological Society, Authority)	Are LARCs Recommended? If yes, Details (eg, Age Group, Conditions, Limitations, etc)
Albania	Y	2009	Ministry of Health	Yes
Belgium	Y	2013	Consensus via advisory board	**Yes for young patients LARC is first choice**
Bosnia and Hercegovina	Y	2010	Federal Ministry of Health	No
Estonia	Y	2015	Estonian Gynecologist Society	Medical eligibility criteria for combined oral contraceptives: but only OC, other methods not detailed
Denmark	Y	2015	Danish Society of Obstetrics & Gynecology	**Yes, can be used in nulliparas**
Finland	Y	2016	Duodecim (medical association)	**As first-line even for nulliparous**
France	Y	2013	Local authority issues best practice recommendation	**Yes, IUS may be used in adolescents or nulliparous women** although insertion might be more difficult
Germany, Switzerland, Austria	N	Expected 2019	DGGG/SGGG/OEGGG (shared approach between gynecological societies of Germany, Switzerland, and Austria	
Greece and Cyprus	N	–	–	–
Hungary	Y	2010	Hungarian Society of Obstetrics and Gynaecology	No; Mirena (Bayer) and copper IUDS are listed as one of the methods available
Italy	Y	2014	SIGO (Italian Society of Obstetrics and Gynecology	**IUS and IUD may be considered as first choice in most women including nulliparous women and adolescents**
Netherlands	Y	2011	NHG (Dutch society of general practitioners) in collaboration with NVOG (Dutch society for obstetrics and gynecology)	The copper IUD and the hormone-containing IUS are both good alternatives to the pill. Contraception is a personal choice on the basis of sound information and advice provided by the general practitioner. No specific preference for LARC
Norway	Y	2015	Norwegian society	**Yes, LARC can be first choice also for nullipara**
Romania	N	–	–	–
Spain	Y	2013, 2014	2013 (Spanish Contraception Society) 2014 (Spanish gynecology and obstetrics society)	**LARC recommended for all women including young and adolescent**
Sweden	Y	2014	Swedish society, authorities, regional bodies	**LARC may be used in all women,** experience with IUD limited in very young
Switzerland	N	–	–	–
United Kingdom	Y	Various, depending on the guideline	FSRH and NICE	NICE guidelines (CG30, 2005) - **IUS may be used by adolescents** but STI risk should be considered. IUS use is not contraindicated in nulliparous women of any age. FSRH Clinical Effectiveness Unit guidelines on intrauterine contraception (2015) - **Use of intrauterine methods should not be restricted on the basis of parity or age alone**

Comments regarding young or nulliparous women are in bold.
DGGG/SGGG/OEGGG, Gynecological Society of Germany, Switzerland; FSRH, Faculty of Sexual and Reproductive Healthcare; IUD, intrauterine device; IUS, intrauterine system; LARC, long-acting reversible contraception; N, no; NHG, Dutch society of general practitioners; NICE, National Institute for Health and Care Excellence; NVOG, Dutch society for obstetrics and gynecology; OC, oral contraceptives; STI, sexually transmitted infection; Y, yes.

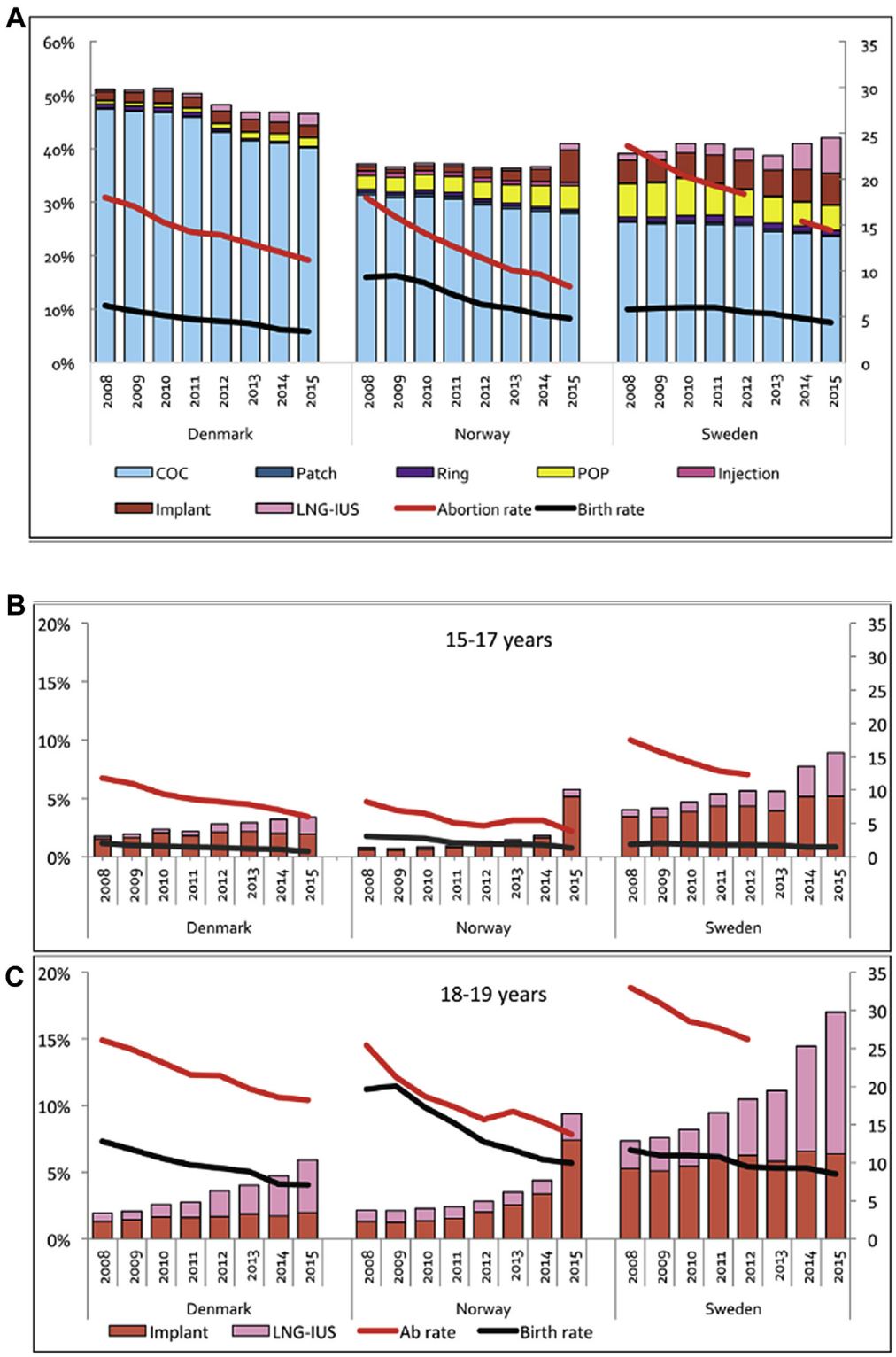

Fig. 1. (A) Use of hormonal contraceptive methods, abortion rate (Ab rate), and birth rates among women aged 15-19 in Denmark, Norway, and Sweden, 2008-2015. Use of implant and levonorgestrel-releasing intrauterine systems (LNG-IUS), Ab rates, and births rates among adolescents aged (B) 15-17 years, and (C) 18-19 years. Please note different scales. Y1 (left side) indicates percent use of hormonal contraception; Y2 (right) the number of abortions and births per 1000 women. COC, combined oral contraception; POP, progestin only pill. Reprinted with permission from Hognert et al.[15]

and 5% used injectables. There are large regional differences in the use of contraception. Over time, use also has varied, particularly for IUDs in the United States.[18] Overall, short-term and reversible methods, such as the pill, injectables, and male condom, are more common than other methods in Africa and Europe whereas long-acting or permanent methods, such as sterilization, implants, and the IUD, are more common in Asia and North America. Among the adult population, China has a very high use of IUDs, 41% in 2006, and India low at approximately 2%. Also in Europe, there are

large differences. In for example, France, Finland, and Norway, the IUD is used by more than 20% of sexually active women. In the United Kingdom and Germany, the use has increased to approximately 10% in 2010, but remained below 5% in Italy. In comparison, IUD use in the United States was reported as 9.5% in 2015. In many African countries, the IUD is used by less than 1%.

In a rare attempt to explore adolescent LARC use in Sub-Saharan African least developed countries, McCurdy et al[19] used evidence from demographic and health surveys. Of 20,000 adolescents who reported sexual activity, 82.6% used no contraception, 4.9% injections, 0.3% implant, and 0.1% IUD. Use of the male condom was reported at 5.5%.

The prevalence of teenage pregnancies in Nicaragua is the highest in Latin America. In 2011, a door-to-door survey was conducted among adolescents living in randomly selected poor neighborhoods of Managua. Hormonal injections were the most common (25%) form of contraception reported by girls, followed by oral contraceptives (13%), IUDs (4%), and implants (0.3%).[20] In a recent large survey on contraceptive use in 23 Latin American and Caribbean countries, the use of LARC was less than 10% in 17 of the countries. Only in Mexico was LARC more common than short-acting methods. Overall, median use of LARC among 15- to 17-year-old women was 1.1% and among 18- to 19-year-old women, 2.0%.[21]

Attitudes and Effects

Factors at the policy, provider, and user level all affect youth access to LARCs.[22] Myths and lack of information about IUDs and implants reduce LARC access and acceptability for youth. Studies in many developing countries indicate that providers lack knowledge, awareness, and skills.[22–24] User-side barriers also include lack of knowledge and fear of side effects. Eke and Alabi-Isama[25] polled female secondary school students between the ages of 10 and 19 years in Nigeria, to assess their LARC knowledge, attitudes, and use. Of the respondents, 34.5% reported being sexually active, 17.9% had heard of LARCs, and 10.6% reported having used LARC methods. The leading reason for LARC nonuse was cultural beliefs. Other common reasons included no perceived need for a longer-acting method, fear of side effects, belief that longer-acting methods cause infertility, partner objection, lack of access, and high cost. However, of LARC users, 95.7% reported being satisfied with the methods. The same percentage said they would recommend LARC to a colleague.

Potential barriers to IUD use in nulliparous women, particularly concerns around infection, significantly higher rates of device expulsion, and adverse effects on fertility, do not appear to be justified. The IUD is appropriate for all medically-eligible women, including nulliparous women, and should be included in the range of contraceptive options discussed during counseling.[26]

A Web-based survey in Argentina, Brazil, Colombia, and Mexico among women who were seeking contraception aimed to understand women's perceived barriers to the use of hormonal and nonhormonal intrauterine contraception in Latin America. More women reported having heard negative stories about the copper IUD than about the LNG-IUS. Approximately half of the women thought that the IUD is only for those who had already had children, more regarding the copper IUD, rather than the LNG-IUS. Only 15%-20% believed it is more effective than other methods of contraception.[27]

In 2004, Suhonen et al published a study on the LNG-IUS (Mirena [Bayer]; n = 94) compared with an oral contraceptive (Marvelon [Merck Sharp & Dohme]; n = 99) over 1 year in 18- to 25-year-old nulliparous women.[28] The study was carried out in 1 family planning center in Finland and 1 in Sweden. Two of the 94 insertions did not succeed (2.1%), 1 because of pain, and marked eversion of the uterus in the other. The 1-year continuation rate was 80% for the LNG-IUS and 73% for the oral contraceptives ($P = .3$). The most common reason (31%) for discontinuation in the intrauterine system group was pain. In the oral contraceptives group, hormonal side effects were the predominant medical reason for study termination. One partial expulsion was observed at the 6-month visit, and the intrauterine system was removed. No other expulsions occurred. No pregnancies or pelvic inflammatory disease were reported in either treatment group in this Nordic study. No significant differences were observed on the sexual questionnaire in either group. The safety and acceptability of the LNG-IUS was observed to be good with a high continuation rate.

The new smaller LNG-IUS make placement even easier for adolescents. The 13.5-mg LNG-IUS (Jaydess in Europe, Skyla in the United States; both from Bayer) is licensed for 3 years, and the 19.5-mg (Kyleena; Bayer) for 5 years. Both use an insertion tube of 3.8-mm in diameter, compared with 4.4 for Mirena (Bayer) and 4.6-4.8 for some other 52-mg LNG-IUSs. A phase III, single-arm study of LNG-IUS 8 (total content, 13.5 mg; Jaydess/Skyla; Bayer) was carried out in 36 European centers in 12- to 17-year-old postmenarcheal adolescents.[29] The placement was successful in 303 of 304 participants (99.7%). No cases of pelvic inflammatory disease, ectopic pregnancy, uterine perforation, or pregnancies were reported during the 12-month study. At month 12/study end, the overall user satisfaction rate was 83.9%. The 12-month continuation rate of 83.8% was quite high for this young adolescent population. There were 10 expulsions (3%), of which 9 were partial.

The results regarding expulsions have been somewhat contradictory. Rasheed and Abdelmonem[30] reported that adolescents in Egypt had significantly ($P < .001$) higher rates of expulsions and displacements compared with adults. Alton et al[31] reported the expulsion risk was greater in nulliparous women ($P = .017$), whereas age was not found to be significant ($P = .22$). Aoun et al[32] reported no difference in expulsion rates between women on the basis of parity. In a planned secondary analysis of the Contraceptive CHOICE Project, the 36-month cumulative expulsion rate was actually lower in nulliparous women compared with parous women (8.4 compared with 11.4; $P < .001$) but higher in women aged 14-19 years compared with older women (18.8 compared with 9.3; $P < .001$).[33] A large phase III trial across 11 countries of 2 low-dose LNG-IUSs (total content 13.5 mg and 19.5 mg, Jaydess/Skyla and Kyleena, respectively; Bayer) including 2884 18- to 35-year-old women of whom 39% were nulliparous, also showed a significantly lower expulsion rate in nulliparous women.[34]

The complete/partial expulsion rate was 2.2%-4.2% across all age and parity subgroups. Both systems were similarly effective regardless of age, parity, and body mass index.

The systematic review by Smith[3] of 12 studies about IUD use in adolescents and nulliparous women supports the positions put forth by the American College of Obstetricians and Gynecologists, the American Academy of Pediatrics, and the WHO regarding the use of IUDs in adolescents. Overall, IUD use in nulliparous women and adolescents was not shown to have increased rates of uterine perforation, pregnancy, pelvic infections, or infertility. Age and parity was reported 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.[3]

In a more recent review,[35] the 12-month continuation of any LARC device was high at 84%. IUD continuation was 74% and implant continuation was 84%. Among postpartum adolescents, the 12-month LARC continuation rate was 84%.

There are conflicting views on the role of ultrasonography. Although most nulligravid women had uterine measurements smaller than the studied devices LNG-IUS (Mirena; Bayer) or a CU-IUD, most insertions were assessed as easy (n = 144; 89%) and only 2 (1.2%) failed in a nonrandomized study in Finland.[36] The authors concluded that ultrasonographic evaluation does not give additional information compared with clinical pelvic examination and sound measure. Although smaller uterine length measurements and steeper flexion angle predicted difficulties, most insertions were uneventful in women with small measures. In another report by the same authors,[37] small uterine cavity size among LNG-IUS users was not associated with worsened clinical outcome, but on the contrary, was beneficial because women with the smallest cavity measurements were frequently amenorrheic and painless at the end of the first year.

When systematic follow-up was done using ultrasonography in a study in Switzerland, the picture was a little different with a high removal rate because of dislocation early after insertion of the IUD.[38] The removal rate was highest in the first year after insertion and did not differ between devices: the 52-mg LNG-IUS removal rate was 18%, and that for the third-generation copper-T IUDs was 20%.

Efforts need to be made to disseminate the evidence that shows that few contraindications exist to IUD use. Addressing health care providers' lack of knowledge, training, and confidence with IUD insertions, particularly in nulliparous women, could have a substantial positive effect on IUD utilization.[39] A total of 676 health care providers and 6027 women completed an online survey in 11 European countries.[40] There was a high prevalence of contraceptive use and general satisfaction with current method across countries. Fifty-five percent of women were using short-acting contraception methods and 19% were using a LARC method; 73% said they would consider LARC if they received more comprehensive information. It seems health care providers tend to underestimate women's interest in receiving information on contraception in general and, more specifically, LARC methods. Greater exploration of women's views on their needs and expectations of contraception could lead to increased knowledge, more effective discussions with health care providers, and a greater likelihood of informed contraceptive choice.[40]

Young nulliparous women who choose LARC still have to decide between the implant and an IUD. In a randomized comparison in 6 European countries between the LNG-IUS 8 and the etonogestrel (ENG) implant[41] among 760 18- to 35-year-old women, 74% were nulliparous. The LNG-IUS 8 was associated with a significantly lower 12-month discontinuation rate compared with the ENG implant (19.6% vs 26.8%); mainly because ENG implant users frequently discontinued because of increased bleeding (3.3% vs 11.3%). More LNG-IUS 8 users than ENG implant users reported being "very/somewhat satisfied" with their bleeding pattern (60.9% vs 33.6%), and reported a preference to continue using their study treatment after the study. However, both methods are well suited for adolescents.

Cost and Other Factors

In the CHOICE project, providing counseling and LARC methods free of charge led to a significant increase in the use of LARC, and a reduction in abortions.[42,43] A similar finding has been noted in the public sector primary health care in Finland. Contraceptive counseling has been free of charge in Finland since 1972, and sexuality education compulsory in school since 1970. The abortion rate is among the lowest among developed countries, 8.2 per 1000 15- to 49-year-old women in 2017, for adolescents 7.5 per 1000. In the city of Vantaa, Finland, located in the Helsinki metropolitan area, all women have been entitled to their first LARC method free of charge since January 1, 2013. The introduction of this public program offered a real world setting to study the effects of providing LARC methods free of charge at the population level. Vantaa has provided family planning services at specialized clinics since 1975. All visits are free of charge. When the LARC program was launched in 2013, all other services remained unchanged. In 2014, 1400 visitors aged 15-19 years of 6000 women in this age group used the services.[44] The mean monthly LARC initiation rate increased significantly in all age groups after implementation of the intervention, most steeply in the 15- to 19-year-old group, by 3.7-fold. In the same age group, the monthly abortion rate declined simultaneously by 36%.[44] The authors used several controls, indicating that the LARC uptake was the underlying mediator between the intervention and the reduction in the rate of abortions. In the neighboring city of Espoo without this program, no changes occurred in abortion rate. Among all women, the adjusted abortion rate in the LARC cohort was 80% lower than in the no LARC cohort and 74% lower than among their matched control participants.[45] Among teenagers, the estimated costs saved from reduced abortions exceeded the costs of providing LARC.

Conclusions

Successful adolescent contraception requires 4 elements: motivation to use contraception, existence of a good

method, ability/possibility to obtain the method, and ability to use it correctly. A good sexuality education through school provides a foundation, and health care providers can give specific individual counseling. Myths and lack of information about IUDs have reduced access and acceptability for adolescent use. There are now convincing recent data and good international guidelines regarding safety and effectiveness including cost-effectiveness of IUD use among adolescents.

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