

Contraception options during pubertal transition: Risks, benefits and considerations

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This article is part of a longitudinal series on gynaecological issues.

Background

The age of puberty and sexual maturation has been decreasing, highlighting the importance of providing appropriate contraception to girls and adolescents. However, challenges remain, including legal implications and understanding the effects of hormonal methods on pubertal development.

Objective

This article aims to equip general practitioners with the knowledge of options, as well as their use and limitations, in young people seeking contraception.

Discussion

No one-size-fits-all approach exists for adolescent contraception. Long-acting reversible contraceptives offer superior contraceptive efficacy, with subdermal implants being the most acceptable regarding the insertion procedure. Condoms should be recommended for protection against sexually transmissible infections. Bone health and mood disorders should be considered when prescribing hormonal contraceptives. Despite the lack of robust evidence regarding harm caused by contraception in adolescents, preventing unintended pregnancies should take precedence, with theoretical risks guiding tailored options for individuals.

THE AGE OF PUBERTY and sexual maturation has been decreasing consistently, with the average age of menarche falling from 16.5 years in 1840 to 12.4 years currently.¹ A study involving nearly 4000 Australian girls and women found that the mean age of first sexual intercourse in those with an unintended pregnancy was 15.5 years, with a range of 7–21 years.² In a 2014 Australian study, the median age at first intercourse was 17 years; however, there was a trend towards the younger participants starting earlier, suggesting that in 2023 this would be lower.³ Arguably, the most important age group to provide appropriate contraception to is girls and adolescents. There remain significant challenges, including knowledge of the law and our incomplete understanding of the effects of hormonal methods on pubertal development. For all options, an age-appropriate discussion should be held around risks and benefits.

Aim

This article aims to equip general practitioners with the knowledge of options, and their use and limitations, in young people seeking contraception.

Hypothetical scenario

A female patient, aged 15 years, presents for the management of acne. At the end of the consultation she asks about using the oral contraceptive pill and, on enquiry, is planning to have intercourse with her male classmate, also aged 15 years. Neither has any previous partners, and both are consenting. Their parents are not aware.

Considerations

Specific laws exist in South Australia⁴ and New South Wales⁵ regarding prescribing contraception to minors; in other states, decisions are made based on 'Gillick competence' principles (also known as the 'Fraser guidelines') stemming from the rulings from a legal case in the UK from 1986.⁵ Gillick competence requires certain conditions to be met before determining whether a young person is 'competent' to make choices about their own health. Such conditions include the young person understanding the advice, the health practitioner being unable to convince the patient to involve their parents, a likelihood of sexual intercourse regardless of your advice, risk to physical

or mental health without contraception and being in the young person's best interest for their parents not to be aware.⁵ Although not a requirement to inform parents if a youth is deemed competent, it remains worthwhile to encourage these patients to have this discussion with their parents because other risks might be elucidated, and it also helps satisfy the competence assessment. Where other household members are not to know about their plans for contraception, consideration must be given to discrete methods, which will not be physically obvious, as can be the case with subdermal implants or the use of pill packets.

Consideration must also be given to age of the partner and any cases where coercion or abuse are present. This topic warrants a separate discussion and will not be covered in this article.

Screening for sexually transmissible infections (STIs) should be encouraged where appropriate.

Time needed in these consults for adequate counselling and risk assessment is likely to exceed that booked, so consideration should be given to whether rebooking is necessary, but with a very clear expectation that a future appointment might not be attended in this group.

Short-term contraception

Caution must be used when prescribing short-term contraception given the increased chance of unintended pregnancy. One group found that 39% of unintended pregnancies while on contraception were while taking the oral contraceptive pill.² The combined oral contraceptive pill (COCP) prevents ovulation through negative feedback to the brain and thickening cervical mucus to function as a barrier to sperm. In younger age groups, the forethought and planning involved in reliably taking an oral contraceptive are often unrealistic. There are, of course, benefits to oral contraceptives, including immediate start and the lack of need for an insertion procedure. There are also desirable non-contraceptive benefits, such as regulating and timing menses and reducing dysmenorrhoea, acne and hirsutism, all common complaints around menarche. The combined pill is preferable to the progesterone-only pill (POP) with

regard to reliability and less chance of pregnancy when a dose is taken late or missed. The drospirenone-only pill (Slinda, Besins Healthcare), a newer POP that became available in Australia in 2021, has the advantage of an increased window for a missed pill of up to 24 hours; however, it does have a greater cost.⁶ There is no evidence that the development of the reproductive system is impacted by oral contraception.⁷

Safety concerns around depot medroxyprogesterone (DMPA) and bone mineral density (BMD) have historically limited its use in adolescents.^{8,9} It is now generally accepted that any decrease in expected BMD is reversible at the cessation of use.¹⁰ Benefits are medium-term use, discretion and no need for an involved fitting procedure. Irregular bleeding can be troublesome and is often the reason for discontinuation, so must be counselled about prior to commencement with a contingency plan, such as concomitant pill use.

The etonogestrel/ethinyloestradiol vaginal ring (NuvaRing, Organon) is an option for those who are comfortable with the concept of inserting something into the vagina. This vaginal ring is a flexible ring that is inserted for three weeks at a time and then removed for one week before being replaced. It has similar risks to the COCP, including deep vein thrombosis, so avoiding it in those with other risk factors is prudent, but one must remember that the risk of a clot with the vaginal ring is still lower than in pregnancy.¹¹

Barrier contraception is an important consideration as the only form of contraception with protection against STIs, 50% of which occur in those aged 15–24 years.¹² However, on its own, failure rates with barrier contraception reach 18–21 pregnancies per 100 in one year with typical use.¹³ Patients must be counselled that there are two reasons for contraception: avoiding unintended pregnancy and avoiding STIs. No single option provides complete reliability for both; hence, using a combination is advisable.

Long-term contraception

For reliability, a long-acting reversible contraceptive (LARC) is superior to all other methods of contraception. Both the subdermal implant and intrauterine devices function through progestogens, which act to

thicken cervical mucus, creating a barrier for sperm, as well as thinning the uterine lining and, in some, preventing ovulation.

The etonogestrel subdermal implant, such as Implanon XT (Merck), provides up to three years of contraception with a failure rate of 0.001% in an Australian population, showing superiority even to tubal ligation.¹⁴ The most common reason for discontinuation is troublesome spotting. However, this can be combatted with oral hormone use without the risk of unintended pregnancy with missed doses. Of all LARCs, the implant is the most appropriate in terms of insertion, but in some it can be seen and a small scar will be present on the upper arm.

Levonorgestrel intrauterine devices such as the Mirena (Bayer), a five-year device with a dose of 52 mg levonorgestrel, are exceptionally reliable and well liked for their added benefit of reduction in menstrual flow.^{15,16} The Mirena is the largest of these devices, measuring 3.2 cm×3.2 cm. The Kyleena (Bayer) is similar, but smaller, at 2.8 cm×3 cm and licensed for five years for contraception, but not for heavy menstrual bleeding management because the progesterone dose is lower (19.5 mg levonorgestrel).¹⁷ Both these devices have been shown to reduce menstrual pain. Menstrual pain was experienced by 50% prior to insertion and 20% after three years with the Mirena.¹⁸ For all levonorgestrel intrauterine devices, the failure rate is <1%.^{17,19–21} Importantly, none is affected by other medications.

Similarly, the copper intrauterine device requires insertion but does not have the benefits of menstrual reduction and, in some, might increase menstrual flow.²² However, it also functions as an emergency contraceptive, which can be useful when the patient presents following unprotected sexual intercourse after the 72-hour window for the emergency contraceptive pill or has a high body mass index, reducing efficacy.²³ The copper intrauterine device lasts 5–10 years. It is important to note that adolescents using LARCs are 60% less likely to use condoms than those using oral contraceptives.²⁴ The risk of adverse events with LARCs is low overall and not thought to be greater in adolescents, with the exception of expulsion, so education around self-checking for strings would be prudent, where possible.²⁵

A systematic review found no increase in pelvic inflammatory disease in those initiating an intrauterine device compared with other contraceptive methods in those at high risk of infection or with current asymptomatic infection.²⁶ One study did find lower pain scores with the use of lignocaine to the cervix and uterus, but no measurement of pain of drug application was reported on.²⁷ However, satisfaction with the insertion procedure in those aged 14–22 years was no greater whether anaesthetic was used or not.²⁸

The use of ibuprofen, misoprostol or cervical or vaginal lignocaine gel does not decrease difficulty or discomfort at insertion.²⁹ In a study of nearly 1200 adolescents and women aged 13–24 years, intrauterine device insertion was successful in 96% of patients on the first attempt.³⁰

Where a wait time for LARC insertion exists, it is reasonable to offer a quick-start bridging method as an interim solution, such as initiating the combined oral contraceptive pill, as suggested by the Faculty of Sexual and Reproductive Healthcare, when you can be reasonably certain pregnancy has not already occurred.³¹

Implications and interactions with contraception on puberty and development

When considering the risks of contraception, namely hormonal contraception, it is prudent to consider these alongside the potential risks of pregnancy in adolescents. To date, there are, of course, no randomised controlled trials examining contraceptive use in adolescents because such research would not be ethically permissible.

Neurodevelopment and mood

Although steroid-dependent development in the perinatal period has been well accepted after its initial proposal in 1959,³² further work has now shown that ongoing steroid-dependent organisation of behaviour occurs during adolescence.³³ This raises legitimate concerns about the effect of hormonal contraceptives on neurodevelopment, mood and behaviour, especially because there appears to be some evidence of detrimental effects.³⁴ It is not yet clear exactly which neurodevelopmental changes occur with

the use of hormonal contraception in this critical period of adolescence, but some have suggested that an impact on central nervous system modifications might trigger later endocrine disruption or have an effect on sexual conduct and spatial ability.³⁵ Long-term studies are lacking, and reluctance to prescribe based on this is not thought to be warranted currently. Mood disorders appear to be increased in those using hormonal contraception, with one study of over one million women showing an association between hormonal contraceptive use and the first use of antidepressants; this link was particularly strong in adolescents.³⁴ The increased risk was more significantly observed in people with attention deficit hyperactivity disorder (ADHD), who have a threefold increase in rates of depression compared with women without ADHD.³⁴ When hormonal contraception was used by adolescents previously diagnosed with ADHD, the risk of depression was increased sixfold.³⁶ Caution prescribing in an at-risk group should be taken and, where possible, screening for mood disorder could be implemented at initiation and repeated at the time of the repeat prescription visit.

Bone health

It has been well documented that there is an effect of hormonal contraception on BMD due to the actions of sex hormones, growth hormones and insulin-like growth factor on bone content and size, ultimately determining bone strength.³⁷ We also know that approximately 40% of final adult bone density is acquired during adolescence; this lags behind peak height velocity by 6–12 months.³⁸ Mean serum oestradiol concentrations in those on no hormonal contraception are 120 pg/mL, compared with mean concentrations of 44 and 20 pg/mL in those on COCP with doses of 30 and 20 micrograms of ethinyl estradiol, respectively.³⁹ It is recognised that lower oestradiol concentrations adversely affect BMD.⁴⁰ In practice though, of eight observational studies identified prior to 2014, six showed no effect of COCP on BMD and two showed a detrimental impact of COCP use on BMD, leading the American National Osteoporosis Foundation to conclude that there was insufficient evidence to suggest that there was any detrimental effect.⁴¹

When prescribing the COCP in adolescents, higher doses of ethinyl estradiol are preferred. Support for this is found in a study examining the use of lower doses in adolescents, in which it was seen that BMD did not increase (as it would in controls) until the adolescents were switched to the higher doses.⁴² Whether these differences translate into increased fracture risk is unknown; certainly in adults, COCP use has not been associated with increased fractures.^{43,44}

As mentioned, there have also been concerns related to reduced bone density with prolonged use of intramuscular DMPA. Of note, adolescents with lower bone density were also shown to be vitamin D deficient, which suggests supplementation might be useful if prescribing in this group,⁴⁵ and we can be reassured that with cessation any changes are reversible.^{10,46}

Final height

A further proposed negative effect on girls starting hormonal contraception is stunting of final adult height, also related to the above-described processes in the interaction of hormonal medication and bone composition.³⁷ To understand why this is unlikely to be a major factor, we refer back to the Tanner stages of development, which range from Stage 1 to Stage 5, with an increasing number relating to more advanced development. Both menstrual regularity and final adult height are reached in Stage 5 in most cases, meaning that commencing contraception is unlikely to occur before the final height is reached.⁴⁷

Weight gain

Regardless of contraceptive use, women and adolescents typically gain weight over time and this is an important point. There is, however, some evidence of increased weight gain in those using DMPA, most significantly in those aged <18 years with a baseline body mass index >30 kg/m².⁴⁸ There is no evidence of weight gain caused by intrauterine contraception, POP, COCCP or etonogestrel implant.⁴⁹

Conclusion

As the age of sexual maturity changes, so too must our comfort to address adolescent contraception in an age-appropriate and evidence-based fashion. Contraceptive options for girls and young adolescents

must be reliable, non-invasive and, most importantly, safe. No one-size-fits-all approach, but a sound knowledge of the most appropriate options and considerations in this age group will set up any general practitioner to provide the best possible care during this crucial consultation and should lead to positive ongoing relationships and optimal health outcomes. We recommend tailoring contraceptive options to each individual,

although where a LARC is acceptable, this will provide superior protection against pregnancy. The subdermal implants are likely to be the most acceptable in terms of the insertion procedure. Condoms should be recommended to all, regardless of other methods, as the only option protecting against STIs. Bone health should be considered with a higher dose of ethinyloestradiol contraceptives preferred, and consideration to vitamin D supplement

given with this or DMPA. Pre-existing or high risk for mood disorders or ADHD should also prompt a discussion around the additional risk of hormonal contraception (Table 1).

With a lack of robust evidence regarding harm caused by contraception in adolescents, it is reasonable to err on the side of preventing known harm of unintended pregnancies, with the knowledge of theoretical risk to help tailor appropriate options for each individual.

Table 1. Advantages and disadvantages of contraception options in adolescents

Type	Advantages	Disadvantages	Pregnancy rate in first year (%)	
			With perfect use ¹³	With typical use ¹³
Condom (internal and external)	<ul style="list-style-type: none"> Protects against STIs Non-hormonal Easily accessible over the counter No side effects 	<ul style="list-style-type: none"> High failure rates for preventing pregnancy Requires cooperation from both partners 	2-5	18-21
COCP	<ul style="list-style-type: none"> Might reduce menstrual flow and pain Can reduce acne and hirsutism Quick start possible Timing or avoiding menstruation possible 	<ul style="list-style-type: none"> Requires daily administration Possible association with mood disorders and reduced BMD Breast tenderness Thrombosis risk 	0.3	9
POP	<ul style="list-style-type: none"> Can be used in smokers Might cause amenorrhoea 	<ul style="list-style-type: none"> Short window for daily administration in most formulations, longer in drospirenone preparation, but greater cost to patient Unscheduled bleeding common Lower efficacy than COCP 	0.3	9
Subdermal progestin implant	<ul style="list-style-type: none"> Low failure rates Long acting 	<ul style="list-style-type: none"> Unscheduled bleeding common Small scar can be visible Requires insertion 	0.001	0.001
Levonorgestrel IUD	<ul style="list-style-type: none"> Some reduce menstrual flow <1% failure rate Decrease in dysmenorrhoea 	<ul style="list-style-type: none"> In rooms, insertion not always acceptable in younger age group or sexually naive 	0.2-0.6	0.2-0.6
Injectable DMPA	<ul style="list-style-type: none"> Easy to conceal use Avoids daily dosing Might cause amenorrhoea 	<ul style="list-style-type: none"> Requires three-monthly injections Reversible reduction in BMD Abnormal bleeding possible Weight gain possible 	0.2	6
Copper IUD	<ul style="list-style-type: none"> Can be used as emergency contraception Lasts 5-10 years 	<ul style="list-style-type: none"> In rooms, insertion not always acceptable in younger age group or sexually naive 	0.6	0.6
Vaginal ring (oestrogen and progesterone)	<ul style="list-style-type: none"> Monthly application Reduction in bleeding possible Remains effective where gastrointestinal upset occur Fewer side effects than OCP because lower dose and locally applied 	<ul style="list-style-type: none"> Breast tenderness Possible increase in vaginal discharge Thrombosis risk Possible exacerbation of acne 	0.3	9

BMD, bone mineral density; COCP, combined oral contraceptive pill; DMPA, depot medroxyprogesterone acetate; IUD, intrauterine device; OCP, oral contraceptive pill; POP, progesterone-only pill; STIs, sexually transmissible infections.

Key points

- The decreasing age of puberty and sexual maturation (the ability to reproduce) highlights the need for appropriate contraception in girls and adolescents.
- General practitioners should be equipped to provide tailored contraceptive options to young people.
- LARCs, particularly subdermal implants, offer superior pregnancy protection, whereas condoms are essential for protection against STIs.
- Consideration of bone health and mood disorders is crucial when prescribing hormonal contraceptives.
- Preventing unintended pregnancies is a priority, with theoretical risks guiding individualised contraceptive choices.

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