Chapter 4 Contraception

♦ An Overview of Contraception

-contraception
-also known as birth control
-refers to the avoidance of pregnancy by various methods that are designed to control fertility and prevent conception

-No single, ideal method of birth control exists.

-The only method of preventing pregnancy that is 100% reliable is complete abstinence, the act of refraining from sexual intercourse.

-Several other methods of contraception are available; each has its advantages and disadvantages.
  -These include sterilization, hormonal methods, intrauterine devices, spermicides, barrier methods, periodic abstinence, and coitus interruptus.

-Figure 4.1 (Derrickson) provides the failure rates for various birth control methods.

-Although it is not a form of birth control, in this chapter you will also learn about abortion, the premature expulsion of the products of conception from the uterus.

♦ Sterilization

-sterilization
-a procedure that renders an individual incapable of further reproduction

-There are two types of surgical sterilization: vasectomy and tubal ligation.

1. vasectomy
-the method of sterilization in males, in which a portion of each vas deferens is removed

-is performed in the following way (Figure 10.12, Crooks):
  -An incision is made on either side of the scrotum.
The vasa deferentia (plural for vas deferens) are located and cut.

Each vas deferens is tied (ligated) or cauterized (burned) and the portion between the sealed ends is removed.

- Although sperm production continues in the testes, sperm can no longer reach the exterior.
  - The sperm degenerate and are destroyed by phagocytosis.

- Because the blood vessels are not cut, testosterone levels in the blood remain normal, so vasectomy has no effect on sexual desire, performance, and ejaculation.

2. tubal ligation
- A method of sterilization in females, in which both fallopian tubes are tied closed and then cut

  - is performed as follows (Figure 10.10, Crooks):
    - The fallopian tubes are located using a laparoscope and then cut.

    Each fallopian tube is tied (ligated) or cauterized (burned) and the portion between the sealed ends is removed.

    - As a result, the egg cannot pass through the fallopian tube, and sperm cannot reach the egg.

  - A type of non-incisional sterilization called Essure® is also available for women.
    - Essure is a non-incisional irreversible procedure that is an alternative to tubal ligation.

    - In the Essure procedure, a soft micro-insert coil (Figure 10.11, Crooks) made of polyester fibers and metals (nickel–titanium and stainless steel) is inserted via a catheter into the vagina, through the uterus, and into each fallopian tube.

    Over a three-month period, the insert stimulates tissue growth (scar tissue) in and around itself, blocking the fallopian tubes.

    - As with tubal ligation, the egg cannot pass through the fallopian tubes, and sperm cannot reach the egg.

    - Unlike tubal ligation, Essure® does not require general anesthesia.
Hormonal Methods

- Aside from complete abstinence or sterilization, hormonal methods are the most effective means of birth control.

- Oral hormonal methods of contraception are very popular.

**oral contraceptives**
- also known as birth control pills

- contain various mixtures of synthetic estrogen and progestin (chemicals with actions similar to progesterone)

- prevent pregnancy by negative inhibition of GnRH release from the hypothalamus and FSH and LH release from the anterior pituitary gland.
  - The resulting low levels of FSH and LH usually prevent the development of an ovarian follicle in the ovary.
  - As a result, levels of estrogen do not rise, the midcycle LH surge does not occur, and ovulation does not take place.

- If, by some chance, ovulation does occur, the progestin in oral contraceptives thickens cervical mucus, making it difficult for sperm to reach the egg and it also blocks implantation in the uterus.

- Among the noncontraceptive benefits of oral contraceptives are regulation of the length of menstrual cycle and decreased menstrual flow.

- However, oral contraceptives may not be advised for women with a history of blood clotting disorders, cerebral blood vessel damage, migraine headaches, hypertension, liver malfunction, or heart disease.

- Women who take the pill and smoke face far higher odds of having a heart attack or stroke than do nonsmoking pill users.
  - Smokers should quit smoking or use an alternative method of contraception.
There are several variations of oral hormonal methods of contraception:

- **combined pill**
  - contains both estrogen and progestin and is typically taken once a day for three weeks
  - The pills taken during the fourth week are inactive (do not contain hormones) and permit menstruation to occur.

- **Seasonale®**
  - contains both estrogen and progestin and is taken once a day in 3-month cycles of 12 weeks of hormone-containing pills followed by one week of inactive pills
  - Menstruation occurs during the thirteenth week.

- **minipill**
  - contains progestin only and is taken every day of the month

- **emergency contraception (EC)**
  - also called the morning after pill
  - an example is Plan B®, which is available without a prescription
  - consists of a birth control pill with a high dose of progestin to prevent pregnancy following unprotected sexual intercourse
  - The relatively high level of progestin in an EC pill suppresses ovulation, thickens cervical mucus to prevent sperm from reaching the egg, and blocks implantation.
  - The pill is taken as soon as possible but within 72 hours of unprotected sexual intercourse.
Non-oral hormonal methods of contraception are also available; among these are the following:

- **Contraceptive skin patch (Ortho Evra®)**
  - Contains both estrogen and progestin delivered in a skin patch placed on the skin (upper outer arm, back, lower abdomen, or buttocks) once a week for three weeks (Figure 10.1, Crooks)
  - After one week, the patch is removed from one location and then a new one is placed elsewhere.
  - During the fourth week no patch is used, allowing menstruation to occur.

- **Vaginal contraceptive ring (NuvaRing®)**
  - A flexible doughnut-shaped ring about 5 cm (2 in.) in diameter that contains estrogen and progestin and is inserted by the female into the vagina (Figure 10.1, Crooks)
  - It is left in the vagina for three weeks to prevent conception and then removed for one week to permit menstruation.

- **Hormone injections (Depo-provera®)**
  - An injectable progestin given intramuscularly by a health-care practitioner once every three months

- **Hormone implant (Implanon®)**
  - A matchstick-sized plastic rod containing progestin that is surgically implanted under the skin of the arm using local anesthesia
  - It slowly and continuously releases progestin, which inhibits ovulation and thickens cervical mucus.
  - The effect lasts for 3 years and is even more reliable than sterilization; removing the implant restores fertility.

- **Intrauterine Devices**
  - An intrauterine device (IUD) is a small, T-shaped object that is inserted by a health-care professional into the cavity of the uterus (Figure 10.7, Crooks).
  - Two types of IUDs are available in the United States: the copper IUD and the hormonal IUD.
    - The copper IUD (ParaGard®) contains a plastic frame that is covered with a copper wire. The copper causes changes in the uterine lining that prevent implantation of the fertilized egg. ParaGard is approved for up to 10 years of use and has long-term effectiveness comparable to that of tubal ligation.
    - The hormonal IUD (Mirena®) has a plastic frame that surrounds a reservoir containing progestin. The progestin is slowly released from the IUD and functions like the other progestin-containing contraceptives: It suppresses ovulation, thickens cervical mucus, and blocks implantation. Mirena is effective for up to 5 years.

  - Some women cannot use IUDs because of expulsion, bleeding, or discomfort.
♦ Spermicides

-Spermicides are sperm-killing agents.

-Spermicides in the form of various foams, creams, jellies, and suppositories can be placed in the vagina before sexual intercourse (Figure 10.5a,b Crooks); they make the vagina and cervix unfavorable for sperm survival.

-The most widely used spermicide is nonoxynol-9, which kills sperm by disrupting their plasma membranes.

-A spermicide is more effective when used with a barrier method such as a male condom, vaginal pouch, or cervical barrier device.

♦ Barrier Methods

-Barrier methods use a physical barrier and are designed to prevent sperm from gaining access to the uterine cavity and fallopian tubes.

-In addition to preventing pregnancy, certain barrier methods (male condom and vaginal pouch) may also provide some protection against sexually transmitted diseases (STDs) such as AIDS.
   -In contrast, oral contraceptives and IUDs confer no such protection.

-Among the barrier methods are the male condom, vaginal pouch, contraceptive sponge, and cervical barrier devices.

• male condom
   -a covering of latex, polyurethane, or animal membrane that is placed over the penis to prevent deposition of sperm in the female reproductive tract (Figure 10.3, Crooks)

• vaginal pouch
   -also known as the female condom
   -designed to prevent sperm from coming in contact with the vaginal wall or uterus
   -It is made of two flexible rings connected by a polyurethane or latex sheath (Figure 10.4, Crooks).
   -One ring lies inside the sheath and is inserted to fit over the cervix; the other ring remains outside the vagina and covers the female external genitalia.
**cervical barrier devices**

-devices that specifically cover the cervix to block sperm entry into the uterus

-are used in conjunction with a spermicide to kill viable sperm

-Although use of a cervical barrier device does decrease the risk of some STDs, it does not significantly protect against HIV infection because the vagina is still exposed.

-There are 5 types of cervical barrier devices: contraceptive sponge, diaphragm, cervical cap, FemCap, and Lea's Shield.

1. **contraceptive sponge**
   -a polyurethane sponge that contains spermicide (Figure 10.5d, Crooks)
   -is placed deep into the vagina so that it covers the cervix
   -functions by blocking the pathway of sperm; it also absorbs and kills sperm
   -does not have to be fitted by a health-care professional; one size fits all
   -can be inserted by the female up to 24 hours before intercourse
   -after intercourse, it should be left in the body for at least 6 hours, but no more than 30 hours total time
   -has an elastic band to facilitate removal

2. **diaphragm**
   -a rubber, dome-shaped structure that covers the cervix (Figure 10.6a, Crooks)
   -must be fitted by a health-care professional
   -Before it is used, spermicide should be added to the dome and on the rim.
   -can be inserted by the female up to 6 hours before intercourse
   -after intercourse, it should be left in the body for at least 8 hours, but no more than 24 hours
3. **cervical cap**
   - a rubber device that resembles a diaphragm but is smaller and more rigid
   - It fits snugly over the cervix and also must be fitted by a health-care professional.
   - Before it is used, spermicide should be added to the dome and on the rim.
   - It can be inserted by the female up to 6 hours before intercourse.
   - After intercourse, it should be left in the body for at least 8 hours, but no more than 24 hours.

4. **FemCap**
   - a silicone, dome-shaped structure that covers the cervix (Figure 10.6b, Crooks)
   - It does not have to be fitted by a health-care professional
     - There are 3 sizes available, depending on the size of the cervix: small, medium, and large.
   - Before it is used, spermicide should be added to the dome and on the rim.
   - It can be inserted by the female up to 8 hours before intercourse.
   - After intercourse, it should be left in the body for at least 8 hours, but no more than 48 hours.
   - It has a flexible loop to facilitate removal.

5. **Lea's Shield**
   - a silicone, dome-shaped structure that covers the cervix
   - It contains a valve that helps to create a suction to hold it in place.
   - It does not have to be fitted by a health-care professional; one size fits all.
   - Before it is used, spermicide should be added to the dome and on the rim.
   - It can be inserted by the female up to 8 hours before intercourse.
   - After intercourse, it should be left in the body for at least 8 hours, but no more than 48 hours.
   - It has a flexible loop to facilitate removal.
♦ Periodic Abstinence

-A couple can use their knowledge of the physiological changes that occur during the female reproductive cycle to decide either to abstain from intercourse on those days when pregnancy is a likely result, or to plan intercourse on those days if they wish to conceive a child.

-In females with normal and regular menstrual cycles, these physiological events help to predict the day on which ovulation is likely to occur.

-Examples of periodic abstinence include the rhythm method and the sympto-thermal method:

- **rhythm method**
  - The rhythm method takes advantage of the fact that the egg is only viable for up to 24 hours and that sperm can survive three to five days in the female reproductive tract.

  - Thus, couples using this method should avoid sexual intercourse for several days before ovulation, the day of ovulation, and several days after ovulation (just in case ovulation occurs a few days after day 14).

  - The effectiveness of the rhythm method for birth control is poor in many women due to the irregularity of the female reproductive cycle.

- **sympto-thermal method**
  - In the sympto-thermal method, couples are instructed to know and understand certain signs of fertility.

  - The signs of ovulation include a slight decrease in basal body temperature prior to ovulation and then a slight increase in basal body temperature just after ovulation; the production of abundant clear, stretchy cervical mucus; and pain associated with ovulation (*mittelschmerz*).

  - If a couple abstains from sexual intercourse when the signs of ovulation are present, the chance of pregnancy is decreased.

  - A big problem with this method is that fertilization can still occur if intercourse takes place a few days before ovulation.

♦ Coitus interruptus

- **Coitus interruptus** is the withdrawal of the penis from the vagina just before ejaculation.

  - Failures with this method are due either to a failure to withdraw before ejaculation or to preejaculatory emission of sperm-containing fluid from the urethra.

  - In addition, this method offers no protection against transmission of STDs.
Abortion

- abortion
  - refers to the premature expulsion of the products of conception from the uterus

-An abortion may be spontaneous (naturally occurring; also called a miscarriage) or induced (intentionally performed).

-There are several types of induced abortions:

  • use of mifepristone

    - mifepristone
      - also known as miniprex in the United States and RU 486 in Europe.

      - a hormone approved only for pregnancies 9 weeks or less when taken with misoprostol (a prostaglandin).

      - Mifepristone is an antiprogestin; it blocks the action of progesterone by binding to and blocking progesterone receptors.
        - Progesterone prepares the uterine endometrium for implantation and then maintains the uterine lining after implantation.
        - If the level of progesterone falls during pregnancy or if the action of the hormone is blocked, menstruation occurs, and the embryo sloughs off along with the uterine lining.

      - Within 12 hours after taking mifepristone, the endometrium starts to degenerate, and within 72 hours it begins to slough off.

      - Misoprostol stimulates uterine contractions, and is given after mifepristone to aid in expulsion of the endometrium.

  • vacuum aspiration (suction)

    - can be performed up to the 16th week of pregnancy

    - In this procedure, a small, flexible tube attached to a vacuum source is inserted into the uterus through the vagina.

      The embryo or fetus, placenta, and lining of the uterus are then removed by suction.
• **dilation and evacuation (D&E)**
  - used for pregnancies between 13 and 16 weeks

  - In this procedure, after the cervix is dilated, suction and forceps are used to remove the fetus, placenta, and uterine lining.

• **late-stage abortion**
  - used for pregnancies from the 16th to 24th week

  - involves surgical methods similar to dilation and evacuation or nonsurgical methods using a saline solution or medications to induce abortion

  - Labor may be induced by using vaginal suppositories, intravenous infusion, or injections into the amniotic fluid through the uterus.
### Figure 4.1
Failure Rates of Several Birth Control Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Failure Rates (%)*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Perfect Use†</td>
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<tr>
<td>Complete abstinence</td>
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<tr>
<td>Sterilization</td>
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<td>Vasectomy</td>
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<td><strong>Hormonal Methods</strong></td>
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<tr>
<td>*Seasonale®</td>
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<tr>
<td>Non-oral contraceptives</td>
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<td><em>Vaginal contraceptive ring</em></td>
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<tr>
<td><em>Hormone injections</em></td>
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<td><strong>Intrauterine devices</strong></td>
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<td>Copper IUD (Paragard®)</td>
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<td>Hormonal IUD (Mirena®)</td>
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<td><strong>Barrier methods</strong></td>
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<td>Vaginal pouch</td>
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<td>Diaphragm (with spermicide)</td>
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<td>Cervical cap (with spermicide)</td>
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<td>Rhythm</td>
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<tr>
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* Defined as the percentage of women having an unintended pregnancy during the first year of use.
† Failure rate when the method is used correctly and consistently.