

# Induced Abortion: An Overview for Internists

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Internists care for many women who have had abortions and many who will seek abortions in the future. Each year, about 2% of all women of reproductive age have an abortion. Women having abortions tend to be young, white, unmarried, and early in pregnancy. Most abortions are done by suction curettage under local anesthesia in a freestanding clinic. However, medical abortion is growing in popularity as a nonsurgical alternative. The regimen approved by the U.S. Food and Drug Administration specifies mifepristone, 600 mg orally, followed 2 days later by misoprostol, 400  $\mu$ g orally (within 49 days from last menses). Recent studies have recommended alternative approaches, such as mifepristone, 200 mg orally, followed in 1 to 3 days by misoprostol, 800  $\mu$ g vaginally (up to 63 days). Medical abortion can be provided by a broader variety of physicians than can surgical abortion. The overall case-fatality rate for abortion is less than 1

death per 100 000 procedures. Infection, hemorrhage, acute hematometra, and retained tissue are among the more common complications. Referral back to the original abortion provider for management is advisable. Overall, induced abortion does not lead to late sequelae, either medical or psychiatric. Of importance, no link exists between induced abortion and later breast cancer. For physicians who are asked to help with a referral, the National Abortion Federation and Planned Parenthood Federation of America have helpful Web sites and networks of high-quality clinics. The cost of abortion (currently about \$372 at 10 weeks) has decreased in recent decades. Provision of ongoing contraception and encouragement of emergency contraception can reduce unintended pregnancies and the need for abortion.

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Most internists' practices include large numbers of patients who have had or will seek induced abortion. Although abortion rates are declining, were they to remain stable, an estimated 43% of all U.S. women would have had one or more induced abortions during their reproductive years (1). More than 30 million U.S. women now share this experience.

Because surgical abortion is one of the most common operations in contemporary practice and new technologies have emerged over the past decade, this article will provide a primer for internists. We describe the numbers and characteristics of women having abortions, review the methods used, summarize safety data, explain how internists can help patients with referrals to abortion providers if requested, and describe costs. We focus on early induced abortion, which dominates practice in the United States. Our sources were textbooks, review articles, and a search through PubMed using the Medical Subject Heading terms *abortion, induced*; *abortion, legal*; and *abortion, therapeutic*.

## WHAT IS AN ABORTION?

Abortion is the removal of a fetus or embryo from the uterus before the stage of viability, further defined as "20 weeks' gestation or fetal weight < 500 g" (2). The latter descriptors are misleading, however, because fetal viability has not been reported at 20 weeks and weight alone is a poor predictor of viability. The terminology of timing is also confusing. The notion of pregnancy "trimesters" was adopted by the U.S. Supreme Court in the *Roe v. Wade* decision of 1973, which legalized abortion nationwide. Regrettably, this obstetrical convention has no basis in biology, and the distinction between first- and second-trimester abortion remains blurred after 3 decades. The practical importance is that states may regulate second-trimester

abortions, for example, specifying that abortions must take place in a hospital. However, pregnancy should be considered a continuum, with no clear demarcations once embryogenesis is complete.

Two terms describe abortion frequency: the annual rate (number of abortions per women of reproductive age) and ratio (number of abortions per live births). The abortion rate in 1999 was 17 abortions per 1000 women age 15 to 44 years; stated alternatively, about 2% of all women of reproductive age have an abortion each year. The corresponding abortion ratio was 256 abortions per 1000 live births, about 1 induced abortion for every 4 live births (3).

## WHO HAS AN ABORTION?

Women who have abortions tend to be young, white, unmarried, and early in pregnancy (Table 1) (3). In 1999, more than half of abortions (58%) were obtained at 8 or fewer weeks of gestation (counted from the first day of the last menstrual period), and 88% were performed before 13 weeks. Suction curettage (also called *vacuum aspiration*) accounted for nearly all abortions.

Several important demographic and medical trends are evident over the past 3 decades (Table 1). The proportion of teenage patients having abortions has declined, as has the proportion of married women. Women have been obtaining abortions at progressively earlier gestational ages and by suction, rather than sharp, curettage (4). As of 1999, over half of all women having abortions were mothers of one or more children. A nationwide survey by the Alan Guttmacher Institute indicated that in 2000 and 2001, most women older than 17 years of age reported a religious affiliation: 43% Protestant, 27% Catholic, 8% other, and 22% no religious affiliation (5). Forty-six percent of women had not used a contraceptive method in the month in which they conceived; inconsistent use of con-

traceptive method was the main cause of pregnancy among those using contraception (6).

### HOW IS A FIRST-TRIMESTER ABORTION PROVIDED?

When women inquire about abortion, physicians should review all the options for the pregnancy as part of informed consent. These include carrying the pregnancy to delivery and keeping the baby, delivering the baby and giving it up for adoption, or abortion. If abortion is chosen, counseling can then focus on the procedures available; this discussion needs to include the efficacy, benefits, risks, and side effects of surgical abortion and, for women at 9 or fewer weeks of gestation, the alternative of medical abortion. The National Abortion Federation ([www.prochoice.org](http://www.prochoice.org)) and Planned Parenthood Federation of America ([www.ppfa.org](http://www.ppfa.org)) Web sites provide information about pregnancy options and providers. Physicians need to understand all local and federal regulations related to abortion provision.

Abortion can be accomplished by surgical or medical techniques. Surgical abortion entails evacuation of the products of conception through the cervix. The phrase “medical” abortion refers to early abortion effected by drugs (usually before 9 weeks of gestation) (7).

### SURGICAL ABORTION

Accurate determination of the duration of the pregnancy is an important prerequisite to abortion; as is often

**Table 1. Characteristics of Women Who Obtained Legal Abortions, United States, 1972 and 1999\***

Characteristic	Distribution, %†	
	1972 (n = 586 760)	1999 (n = 861 789)
<b>Age</b>		
≤19 y	33	19
20–24 y	33	32
≥25 y	35	49
<b>Race</b>		
White	77	56
Black	23	37
Other	–	7
<b>Marital status</b>		
Married	30	19
Unmarried	70	81
<b>Live births</b>		
0	49	41
1	18	28
≥2	32	32
<b>Gestational age</b>		
≤8 wk	34	58
9–12 wk	48	30
13–20 wk	17	11
≥21 wk	1	2
<b>Type of procedure</b>		
Suction curettage	65	96
Sharp curettage	23	2
Other	11	2

\* Source: Centers for Disease Control and Prevention (3).

† Totals may not add to 100% because of rounding.

### Key Summary Points

Each year, about 2% of all women of reproductive age in the United States have an induced abortion.

Most abortions are performed by vacuum aspiration under local anesthesia in freestanding clinics.

Use of medical abortion with mifepristone plus misoprostol, methotrexate plus misoprostol, or misoprostol alone is growing in early pregnancy.

Abortion remains one of the safest procedures in contemporary practice, with a case-fatality rate less than 1 death per 100 000 procedures.

Abortion does not lead to an increased risk for breast cancer or other late psychiatric or medical sequelae.

The National Abortion Federation and Planned Parenthood Federation of America have helpful Web sites and networks of high-quality clinics.

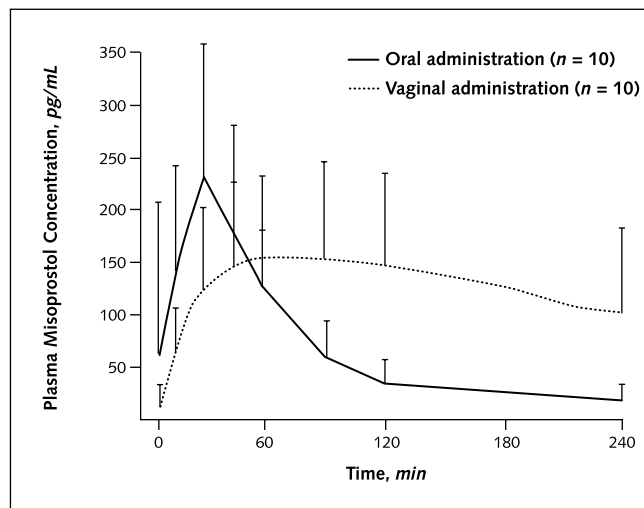
the case in surgery, surprises are unwelcome. Therefore, most National Abortion Federation clinics surveyed (66%) use ultrasonography to confirm gestational age before surgical abortion (8).

Suction curettage dominates practice in the United States. This technique evacuates the uterine contents with negative pressure; the source of vacuum is commonly an electrical pump or a hand-held syringe. The process involves cervical dilation to a diameter less than 12 mm, followed by evacuation of the uterine contents. Physicians have traditionally inserted a series of progressively larger metal or plastic dilators for dilation. In recent years, use of vaginal or oral misoprostol, a prostaglandin E<sub>1</sub> derivative, has grown in popularity. Administration of misoprostol, 400 μg (2 tablets) vaginally, for 2 to 3 hours before the abortion softens and opens the cervix (9), although whether this decreases complication rates or improves patient acceptability is unknown.

After the cervix is dilated, a plastic cannula is introduced into the uterine cavity and connected to the suction source to perform the abortion. Cannulas range in diameter from 4 to 14 mm. Suction curettage is safer, faster, and more comfortable than its predecessor, sharp curettage (also termed *D & C* for *dilation and curettage*). Procedure time is usually less than 5 minutes.

Local anesthesia is the most common approach to pain control. In a recent survey of providers, 58% used paracervical block with or without oral premedication, 32% combined paracervical block with intravenous sedation, and 10% used general anesthesia (8). Local anesthesia is both safer and less expensive than general anesthesia, although pain relief is not complete. With local anesthesia, most women have discomfort similar to bad menstrual cramps during the operation; this resolves soon after the operation is finished. Most women are comfortable at the time of discharge.

**Figure 1.** Mean plasma concentrations of misoprostol acid over time with oral and vaginal administration.



Error bars represent 1 SD. (Reprinted from Zieman M, Fong SK, Benowitz NL, Bansketer D, Darney PD. Absorption kinetics of misoprostol with oral or vaginal administration. *Obstet Gynecol.* 1997;90:88-92, with permission from The American College of Obstetricians and Gynecologists [14]).

After the abortion, the woman is monitored in a recovery room for about 30 minutes. Before discharge, she receives information about warning signs of common complications, and most women leave the clinic with their chosen method of contraception. Standard practice is for the physician or a designee to inspect the aspirated tissue to confirm successful completion of the abortion and to exclude an unsuspected ectopic pregnancy. Formal pathologic examination of the products of conception is unnecessary (10). Women who are Rh negative receive Rh immunoglobulin. Many women resume their usual activities the same day as the abortion, although some prefer to wait another day before returning to routine daily activity.

A follow-up visit is usually scheduled in 2 or 3 weeks, but evidence supporting the benefit of this visit is lacking. Moreover, only about half of women opt to return. The principal use of the follow-up visit may be management of contraception. If an internist sees an asymptomatic woman for follow-up after abortion, a pelvic examination is typically performed but is unnecessary. Likewise, no laboratory tests are indicated. Most important, the patient should be asked how she is doing with her chosen contraceptive.

## MEDICAL ABORTION

The most commonly used medical abortion regimen throughout the world is mifepristone followed by a prostaglandin analogue, usually misoprostol. However, in areas without access to mifepristone, methotrexate and misoprostol or misoprostol alone are acceptable alternatives. Mifepristone regimens result in higher rates of complete abortion and cause expulsion more rapidly than those us-

ing methotrexate and misoprostol and misoprostol alone (11, 12).

Mifepristone, a derivative of the progestin norethindrone, binds strongly to the progesterone receptor without activation, thereby acting as an “antiprogestin.” Mifepristone results in separation of the trophoblast from the endometrial wall; it also increases endogenous prostaglandin release and sensitizes the myometrium to exogenous prostaglandins. In addition, mifepristone softens the cervix to allow expulsion. Initial studies of mifepristone attempted to find the optimal regimen to achieve acceptable rates of expulsion. However, not until investigators began following mifepristone with small doses of a prostaglandin analogue did the efficacy approach 100% (13).

Misoprostol is the prostaglandin analogue most commonly used with mifepristone because of its safety, low cost, and stability at room temperatures. Misoprostol can also be placed in the vagina, which leads to slower absorption and a lower peak serum level (14). However, the area under the curve following vaginal misoprostol is greater (Figure 1). In addition, vaginal administration may have direct cervical and uterine effects. Clinically, vaginal administration of misoprostol results in greater efficacy and lower rates of continuing pregnancy (15, 16).

The mifepristone and prostaglandin analogue regimen for medical abortion, approved by the U.S. Food and Drug Administration (FDA), involves a single 600-mg oral dose of mifepristone followed approximately 48 hours later by misoprostol, 400  $\mu$ g orally, in women up to 49 days of gestation. This results in complete abortion in 92% to 99% of women (11, 17, 18). Between 2% and 5% of women will abort before misoprostol administration (16–18).

Gestational age and location of the pregnancy are confirmed before mifepristone administration. In the United States, vaginal ultrasonography is commonly performed for these purposes. The patient then takes the mifepristone under observation by a health care provider. The FDA guidelines for mifepristone regimens for medical abortion stipulate that the patient should return in 2 days for an evaluation before misoprostol administration. Once she swallows the misoprostol, the patient has the option of staying in the office for observation or returning home. Some clinicians administer additional doses of misoprostol if abortion has not occurred. A follow-up examination is performed 2 weeks later to confirm expulsion, which is based on the patient’s history of events after misoprostol use and pelvic examination. Suction curettage is performed if complete expulsion has not occurred.

The FDA-approved dose of mifepristone is excessive. A 200-mg dose is as effective as the 600-mg dose when combined with a prostaglandin analogue (18–21). Because mifepristone is the more expensive of the medications, lower-dose regimens are more economical.

Women can administer misoprostol themselves, eliminating a trip back to the provider (15, 21–24). In the 3 largest trials using mifepristone, 200 mg, and misoprostol,

800  $\mu\text{g}$  vaginally (21, 22, 24), 90% of women in all studies found home use of misoprostol acceptable regardless of previous abortion experience (22), gestational age (21), or time between mifepristone and misoprostol use (24). Four (0.1%) participants in 2 studies totaling almost 4500 women experienced adverse events soon after misoprostol administration (21, 22). Only one of these events could have been avoided with observation of the woman in an office or clinic.

Misoprostol can be used sooner after mifepristone than the time interval recommended by the FDA. Regimens with a shorter interval between mifepristone and misoprostol administration, if effective, might reduce abortion times and increase acceptability (24). In addition, because approximately half of women bleed during the 48 hours after mifepristone is given (18, 22), administering the misoprostol sooner would decrease such an undesirable side effect. The standard regimen with an interval of only 6 to 8 hours is ineffective. However, Schaff and colleagues (15, 24) demonstrated in 2 multicenter, randomized trials that the regimen of mifepristone, 200 mg, followed between 24 and 72 hours later by misoprostol, 800  $\mu\text{g}$  vaginally, is more effective than regimens with oral misoprostol.

Follow-up sooner than 2 weeks can accurately predict successful abortion when vaginal ultrasonography is routinely used to confirm expulsion (15, 21, 22, 24). Without ultrasonography, whether the patient or physician can accurately assess outcome in these situations is unknown. The main goal of the ultrasonography is to determine the presence or absence of the gestational sac. Harwood and colleagues (25) demonstrated that clot and debris are normally seen in the uterus when transvaginal ultrasonography is used after medical abortion; the thickness of the endometrial lining does not predict abortion success.

Current evidence supports use of regimens with mifepristone, 200 mg, followed 24 to 72 hours later by misoprostol, 800  $\mu\text{g}$  (up to 63 days of gestation). The misoprostol can be administered by the patient at home at a convenient time. A follow-up evaluation can be performed by physical examination at 2 weeks or sooner if transvaginal ultrasonography is used to assess the uterine cavity.

Pain management typically includes use of ibuprofen or acetaminophen initially, with oral narcotics if necessary. The use of a nonsteroidal anti-inflammatory drug, such as ibuprofen, is not contraindicated and does not decrease the likelihood of abortion after administration of a prostaglandin analogue (26). Some clinics provide patients with a prescription for 20 plain codeine tablets with instructions to use 1 to 3 tablets as needed should the nonsteroidal anti-inflammatory drugs provide inadequate relief. Bleeding typically begins within 3 hours of misoprostol administration. Even though heavy bleeding is expected, patients are typically fine unless they are soaking 2 thick sanitary pads per hour for 2 consecutive hours (27). While intervention may not be necessary, consultation with the pro-

vider is advisable. Management at that point should reflect the patient's physical and emotional comfort and baseline hemoglobin level as well as whether the bleeding is slowing. Transportation time to emergency care, if necessary, should also be considered.

The duration of bleeding after a medical abortion using mifepristone varies among studies. Three studies, including 2 from France, found an average duration of bleeding of 9 days (16, 17, 28), with a range of 1 to 32 days (16, 17). However, the remainder of studies, including those from the United States, report a mean duration of bleeding of 14 to 17 days (22, 23, 29), with a range of 1 to 69 days (18, 23, 30). Davis and colleagues (31) followed women by using bleeding diaries to document bleeding patterns after administration of mifepristone and vaginal misoprostol. They reported bleeding for a mean of 14 days and spotting for a mean of 10 days. Overall, women had bleeding or spotting for an average of 24 days, longer than what is typically reported in efficacy studies. Twenty percent of women had bleeding or spotting that lasted more than 35 days.

## WHO CAN PROVIDE MEDICAL ABORTION?

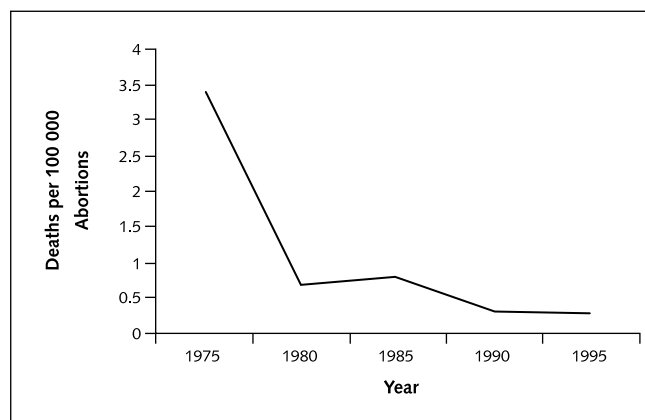
Although gynecologists provide most surgical abortions, a broader variety of physicians may be able to provide medical abortions. These include family physicians, internists, and pediatricians. If the physician providing medical abortion does not have the skills or equipment for suction curettage, referral to other physicians can meet this occasional need. Physicians interested in obtaining mifepristone for medical abortion need to apply to the distributor (Danco Laboratories, New York, New York; [www.earlyoptionpill.com](http://www.earlyoptionpill.com)). Training is available from the National Abortion Federation and other organizations.

## HOW SAFE IS ABORTION?

Abortion is one of the safest procedures in contemporary practice. However, in some developing countries where safe, legal abortion is not available, 50 000 to 70 000 women die of unsafe abortion each year. Refinements in abortion technology, improvements in prevention and management of complications, and earlier abortions have all contributed to the impressive safety record (4) (Figure 2). The case-fatality rate from abortion today is less than 1 death per 100 000 abortions (32, 33). By comparison, the risk for death from anaphylaxis after parenteral administration of penicillin is about 2 per 100 000 events. The risk for complications is also low. In a recent large case series report, the risk for a complication requiring hospitalization was 0.7 per 1000 abortions; less serious complications occurred in 8 per 1000 abortions (34).

Both gestational age and abortion method influence abortion safety; in general, the earlier the abortion, the safer (Table 2). In terms of mortality risk, suction curettage early in pregnancy is the safest method that has been

Figure 2. Case-fatality rate for legal abortions, United States, selected years, 1975 to 1995.



Source: Centers for Disease Control and Prevention (32).

widely used. Delays in obtaining services, regardless of the cause, tend to increase both the risk and cost of abortions. Suction curettage is safer than sharp curettage; medical abortion also has low complication rates.

Infection, hemorrhage, acute hematometra, and retained tissue are among the more common complications (27). The low risk for infection is further reduced by administration of prophylactic antibiotics, a practice that is evidence-based (35) and widely used (8). A common antibiotic is doxycycline. Some surgeons send patients home with a short course of methylergonovine maleate to minimize uterine atony and bleeding, although evidence does not support any benefit of this treatment (36). The risk for hemorrhage severe enough to require blood transfusion is remote. Hematometra occurs when the uterine cavity fills with clotted and liquid blood in the postoperative period. Little or no vaginal bleeding accompanied by increasing lower abdominal cramping and an enlarged uterus suggest the diagnosis; prompt repeated aspiration of the uterus is both diagnostic and therapeutic. Repeated aspiration is also diagnostic and therapeutic for retained tissue, which causes continued or increasing bleeding after the procedure.

When primary care physicians are consulted by patients who are having complications after abortion, prompt referral back to the abortion provider is usually indicated. Some problems, such as hematometra, are uncommon out-

side of abortion practice, and gynecologists who do not perform abortions may have little experience with it. Moreover, clinics often provide care of complications at no additional charge to the woman.

### DOES ABORTION HAVE LATE SEQUELAE?

Extensive literature has documented the long-term safety of abortion. Induced abortion does not harm a woman's reproductive capacity. Premature birth, infertility, ectopic pregnancy, spontaneous abortion, and adverse pregnancy outcomes are not increased in frequency after abortion. The question of placenta previa is unsettled; some reports have found an increased risk for this abnormal placental attachment in later pregnancies, whereas others have not (37).

Induced abortion does not harm women's emotional health; for most women, it allows an overall improvement in quality of life (38, 39). Indeed, the most common reaction to abortion is a profound sense of relief. In some studies, abortion has been linked with improved psychological health because the abortion resolved an intense crisis in the woman's life. The alleged "postabortion trauma syndrome" does not exist (40).

Abortion does not increase a woman's risk for cancer. Flawed epidemiologic studies led to claims that abortion elevates a woman's risk for breast cancer in later life. However, recall bias among controls in case-control studies accounts for this association; large cohort studies from Scandinavia have found either no association or a protective effect of abortion (41). After review of the evidence, both the World Health Organization and the National Cancer Institute have concurred that no credible evidence supports a link between abortion and breast cancer.

### WHERE CAN A WOMAN GET AN ABORTION?

Most surgical abortions (93% in 2000) are provided in freestanding abortion clinics (42). Comparable data are unavailable for medical abortion. Clinics typically feature high-quality care in attractive surroundings. Most women receive services during a single visit. Because of economies of scale, clinics can provide services at lower costs than hospitals and most physicians' offices. Because clinics limit their clientele to healthy patients and because their sur-

Table 2. Case-Fatality Rates for Legal Abortion, by Procedure and Gestational Age, United States, 1972 to 1987\*

Procedure	Gestational Age						Total
	≤8 wk	9–10 wk	11–12 wk	13–15 wk	16–20 wk	≥21 wk	
Curettage	0.3	0.7	1.1				0.5
Dilation and evacuation†				2.0	6.5	11.9	3.7
Labor induction				3.8	7.9	10.3	7.1
Total‡	0.4	0.7	1.1	2.2	6.9	10.4	1.0

\* Deaths per 100 000 abortions. Data obtained from Lawson et al. (33).

† Dilation and evacuation is instrumental abortion through the cervix at 13 or more weeks of gestation.

‡ Includes deaths from other rare procedures, such as hysterotomy or hysterectomy.

geons are so experienced, complication rates are low (34). Paradoxically, abortions performed in hospitals have higher complication rates than do clinic abortions, in part because of higher-risk patients, residents in training, and less experienced surgeons than in freestanding clinics (43).

Access to abortion clinics remains a problem: Clinics cluster in metropolitan areas. About one third of women of reproductive age live in the 87% of U.S. counties without an abortion provider (42). Among the nation's 276 metropolitan areas, 86 have no provider. About a quarter of women have to travel 50 miles or more to reach a clinic (44); this geographic barrier hinders both service provision (45) and follow-up in case of complications.

### HOW DO I LOCATE A PROVIDER AND MAKE A REFERRAL?

Making an appropriate referral for an abortion is an important role for internists. Most urban areas have both clinics and private physicians who provide abortion services as part of general gynecologic practice. Clinics in the community tend to advertise in the yellow pages of the local telephone directory.

Referring physicians and their patients can identify reputable providers of abortion services through the National Abortion Federation, the professional association of abortion providers in the United States and Canada. The National Abortion Federation operates a hotline with factual information about abortion and pregnancy options in both English and Spanish. Information about member physicians and clinics can be obtained by calling 800-772-9100, and more information about the hotline is available at [www.prochoice.org](http://www.prochoice.org). In addition, many clinics of the Planned Parenthood Federation of America provide abortions. Its Web site ([www.ppfa.org](http://www.ppfa.org)) enables users to find health centers near their ZIP code.

Clinicians and women need to be wary of fake clinics, biased counseling centers (numbering over 3000 nationwide), and misleading Web sites. Some telephone directory yellow pages include "crisis pregnancy counseling" facilities, which provide only directive counseling against abortion. This commonly includes misleading and deceptive messages (46). For example, the Web site [www.prochoice.com](http://www.prochoice.com), similar to the National Abortion Federation's Web address, lists "Developing breast cancer" as an abortion risk and warns that abortion "is a rip off with little concern for the patient, it's a business." Links from this Web site connect to the Elliot Institute, an antiabortion organization.

When a referral is made, faxing to the clinic or providing the woman copies of relevant medical reports and tests, including her blood type or hemoglobin level, can expedite care. Background information is especially helpful regarding the need for administering antibiotics for cardiac prophylaxis, although few patients having an abortion fulfill American Heart Association criteria (47). If ultrasonog-

raphy has been performed, a copy of the report should be provided as well.

### HOW MUCH DOES AN ABORTION COST?

Unlike most other operations, the cost of abortion has dropped dramatically over the past 3 decades (48). The current charges are below market value for several reasons. First, the Hyde Amendment cut off federal payment of nearly all abortions for poor women in 1977, and clinics have intentionally tried to keep the price within reach of women of limited means. Seventeen states, including California and New York, currently use state funds to pay for medically necessary abortions; 33 states and the District of Columbia prohibit funding of medically necessary abortions, except in extraordinary cases (49). Nationwide, only a quarter of women receive services billed directly to public or private insurance (44). Second, competition between clinics in cities has kept costs low. In 2001 and 2002, the average self-paying woman was charged \$372 for a surgical abortion at 10 weeks. Adjusted for the increase in the consumer price index over the past 3 decades, the charge should be several times higher (48). In general, clinics set medical and surgical abortion prices to be similar so as to eliminate financial reasons for women to choose between the methods.

Induced abortion represents secondary prevention of an unintended pregnancy. Primary prevention, through ongoing and emergency contraception, deserves more attention from all physicians. Contraception is especially important for women with serious illnesses, for whom unintended pregnancy may pose special risks. Provision of contraception and encouragement of emergency contraception, as needed, can further reduce the burden of suffering from unintended pregnancies nationwide.

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### References

1. Henshaw SK. Unintended pregnancy in the United States. *Fam Plann Perspect.* 1998;30:24-9, 46. [PMID: 9494812]
2. Stedman's Medical Dictionary. Philadelphia: Lippincott Williams & Wilkins; 2000.
3. Elam-Evans LD, Strauss LT, Herndon J, Parker WY, Whitehead S, Berg CJ. Abortion surveillance—United States, 1999. *MMWR Surveill Summ.* 2002;51:1-9, 11-28. [PMID: 12495293]
4. Cates W, Grimes DA, Schulz KF. Abortion surveillance at CDC: creating public health light out of political heat. *Am J Prev Med.* 2000;19:12-7. [PMID: 10811111]

10863125]

5. Jones RK, Darroch JE, Henshaw SK. Patterns in the socioeconomic characteristics of women obtaining abortions in 2000-2001. *Perspect Sex Reprod Health.* 2002;34:226-35. [PMID: 12392215]
6. Jones RK, Darroch JE, Henshaw SK. Contraceptive use among U.S. women having abortions in 2000-2001. *Perspect Sex Reprod Health.* 2002;34:294-303. [PMID: 12558092]
7. Creinin MD. Medical abortion regimens: historical context and overview. *Am J Obstet Gynecol.* 2000;183:S3-9. [PMID: 10944364]
8. Lichtenberg ES, Paul M, Jones H. First trimester surgical abortion practices: a survey of National Abortion Federation members. *Contraception.* 2001;64:345-52. [PMID: 11834232]
9. Singh K, Fong YF, Prasad RN, Dong F. Randomized trial to determine optimal dose of vaginal misoprostol for preabortion cervical priming. *Obstet Gynecol.* 1998;92:795-8. [PMID: 9794671]
10. Paul M, Lackie E, Mitchell C, Rogers A, Fox M. Is pathology examination useful after early surgical abortion? *Obstet Gynecol.* 2002;99:567-71. [PMID: 12039112]
11. Wiebe E, Dunn S, Guilbert E, Jacot F, Lugtig L. Comparison of abortions induced by methotrexate or mifepristone followed by misoprostol. *Obstet Gynecol.* 2002;99:813-9. [PMID: 11978292]
12. Jain JK, Dutton C, Harwood B, Meckstroth KR, Mishell DR Jr. A prospective randomized, double-blinded, placebo-controlled trial comparing mifepristone and vaginal misoprostol to vaginal misoprostol alone for elective termination of early pregnancy. *Hum Reprod.* 2002;17:1477-82. [PMID: 12042265]
13. Bygdeman M, Swahn ML. Progesterone receptor blockage. Effect on uterine contractility and early pregnancy. *Contraception.* 1985;32:45-51. [PMID: 4053605]
14. Ziemann M, Fong SK, Benowitz NL, Banskter D, Darney PD. Absorption kinetics of misoprostol with oral or vaginal administration. *Obstet Gynecol.* 1997;90:88-92. [PMID: 9207820]
15. Schaff EA, Fielding SL, Westhoff C. Randomized trial of oral versus vaginal misoprostol at one day after mifepristone for early medical abortion. *Contraception.* 2001;64:81-5. [PMID: 11704083]
16. el-Refaei H, Rajasekar D, Abdalla M, Calder L, Templeton A. Induction of abortion with mifepristone (RU 486) and oral or vaginal misoprostol. *N Engl J Med.* 1995;332:983-7. [PMID: 7885426]
17. Peyron R, Aubeny E, Targosz V, Silvestre L, Renault M, Elkik F, et al. Early termination of pregnancy with mifepristone (RU 486) and the orally active prostaglandin misoprostol. *N Engl J Med.* 1993;328:1509-13. [PMID: 8479487]
18. Spitz IM, Bardin CW, Benton L, Robbins A. Early pregnancy termination with mifepristone and misoprostol in the United States. *N Engl J Med.* 1998;338:1241-7. [PMID: 9562577]
19. Termination of pregnancy with reduced doses of mifepristone. World Health Organisation Task Force on Post-ovulatory Methods of Fertility Regulation. *BMJ.* 1993;307:532-7. [PMID: 8400972]
20. Comparison of two doses of mifepristone in combination with misoprostol for early medical abortion: a randomised trial. World Health Organisation Task Force on Post-ovulatory Methods of Fertility Regulation. *BJOG.* 2000;107:524-30. [PMID: 10759273]
21. Schaff EA, Fielding SL, Eisinger SH, Stadius LS, Fuller L. Low-dose mifepristone followed by vaginal misoprostol at 48 hours for abortion up to 63 days. *Contraception.* 2000;61:41-6. [PMID: 10745068]
22. Schaff EA, Eisinger SH, Stadius LS, Franks P, Gore BZ, Poppema S. Low-dose mifepristone 200 mg and vaginal misoprostol for abortion. *Contraception.* 1999;59:1-6. [PMID: 10342079]
23. Schaff EA, Stadius LS, Eisinger SH, Franks P. Vaginal misoprostol administered at home after mifepristone (RU486) for abortion. *J Fam Pract.* 1997;44:353-60. [PMID: 9108832]
24. Schaff EA, Fielding SL, Westhoff C, Ellertson C, Eisinger SH, Stadius LS, et al. Vaginal misoprostol administered 1, 2, or 3 days after mifepristone for early medical abortion: A randomized trial. *JAMA.* 2000;284:1948-53. [PMID: 11035891]
25. Harwood B, Meckstroth KR, Mishell DR, Jain JK. Serum beta-human chorionic gonadotropin levels and endometrial thickness after medical abortion. *Contraception.* 2001;63:255-6. [PMID: 11448465]
26. Creinin MD, Shulman T. Effect of nonsteroidal anti-inflammatory drugs on the action of misoprostol in a regimen for early abortion. *Contraception.* 1997;56:165-8. [PMID: 9347207]
27. Paul M, Lichtenberg ES, Borgatta L, Grimes DA, Stubblefield PG, eds. *A Clinician's Guide to Medical and Surgical Abortion.* New York: Churchill Livingstone; 1999.
28. Aubeny E, Peyron R, Turpin CL, Renault M, Targosz V, Silvestre L, et al. Termination of early pregnancy (up to 63 days of amenorrhea) with mifepristone and increasing doses of misoprostol [corrected]. *Int J Fertil Menopausal Stud.* 1995;40 Suppl 2:85-91. [PMID: 8574255]
29. McKinley C, Thong KJ, Baird DT. The effect of dose of mifepristone and gestation on the efficacy of medical abortion with mifepristone and misoprostol. *Hum Reprod.* 1993;8:1502-5. [PMID: 8253942]
30. Thong KJ, Baird DT. Induction of abortion with mifepristone and misoprostol in early pregnancy. *Br J Obstet Gynaecol.* 1992;99:1004-7. [PMID: 1477003]
31. Davis A, Westhoff C, De Nonno L. Bleeding patterns after early abortion with mifepristone and misoprostol or manual vacuum aspiration. *J Am Med Womens Assoc.* 2000;55:141-4. [PMID: 10846324]
32. Herndon J, Strauss LT, Whitehead S, Parker WY, Bartlett L, Zane S. Abortion surveillance—United States, 1998. *MMWR Surveill Summ.* 2002;51:1-32. [PMID: 12369584]
33. Lawson HW, Frye A, Atrash HK, Smith JC, Shulman HB, Ramick M. Abortion mortality, United States, 1972 through 1987. *Am J Obstet Gynecol.* 1994;171:1365-72. [PMID: 7977548]
34. Hakim-Elahi E, Tovell HM, Burnhill MS. Complications of first-trimester abortion: a report of 170,000 cases. *Obstet Gynecol.* 1990;76:129-35. [PMID: 2359559]
35. Sawaya GF, Grady D, Kerlikowske K, Grimes DA. Antibiotics at the time of induced abortion: the case for universal prophylaxis based on a meta-analysis. *Obstet Gynecol.* 1996;87:884-90. [PMID: 8677129]
36. de Groot AN, van Dongen PW, Vree TB, Hekster YA, van Roosmalen J. Ergot alkaloids. Current status and review of clinical pharmacology and therapeutic use compared with other oxytocics in obstetrics and gynaecology. *Drugs.* 1998;56:523-35. [PMID: 9806101]
37. Atrash HK, Hogue CJ. The effect of pregnancy termination on future reproduction. *Baillieres Clin Obstet Gynaecol.* 1990;4:391-405. [PMID: 2225607]
38. Adler NE, David HP, Major BN, Roth SH, Russo NF, Wyatt GE. Psychological responses after abortion. *Science.* 1990;248:41-4. [PMID: 2181664]
39. Westhoff C, Picardo L, Morrow E. Quality of life following early medical or surgical abortion. *Contraception.* 2003;67:41-7. [PMID: 12521657]
40. Stotland NL. The myth of the abortion trauma syndrome. *JAMA.* 1992;268:2078-9. [PMID: 1404747]
41. Bartholomew LL, Grimes DA. The alleged association between induced abortion and risk of breast cancer: biology or bias? *Obstet Gynecol Surv.* 1998;53:708-14. [PMID: 9812330]
42. Finer LB, Henshaw SK. Abortion incidence and services in the United States in 2000. *Perspect Sex Reprod Health.* 2003;35:6-15. [PMID: 12602752]
43. Grimes DA, Cates W Jr, Selik RM. Abortion facilities and the risk of death. *Fam Plann Perspect.* 1981;13:30-2. [PMID: 7215517]
44. Henshaw SK, Finer LB. The accessibility of abortion services in the United States, 2001. *Perspect Sex Reprod Health.* 2003;35:16-24. [PMID: 12602753]
45. Shelton JD, Brann EA, Schulz KF. Abortion utilization: does travel distance matter? *Fam Plann Perspect.* 1976;8:260-2. [PMID: 1001409]
46. Mertus JA. Fake abortion clinics: the threat to reproductive self-determination. *Women Health.* 1990;16:95-113. [PMID: 2309498]
47. Dajani AS, Taubert KA, Wilson W, Bolger AF, Bayer A, Ferrieri P, et al. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. *Circulation.* 1997;96:358-66. [PMID: 9236458]
48. Forrest JD, Henshaw SK. Providing controversial health care: abortion services since 1973. *Womens Health Issues.* 1993;3:152-7. [PMID: 8274870]
49. Alan Guttmacher Institute. State policies in brief. State funding of abortion under Medicaid. Accessed at [www.guttmacher.org/pubs/spib\\_SFAM.pdf](http://www.guttmacher.org/pubs/spib_SFAM.pdf) 10 July 2003.

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