Unsafe abortion: the silent scourge

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An estimated 19 million unsafe abortions occur worldwide each year, resulting in the deaths of about 70,000 women. Legalization of abortion is a necessary but insufficient step toward improving women's health. Without skilled providers, adequate facilities and easy access, the promise of safe, legal abortion will remain unfulfilled, as in India and Zambia. Both suction curettage and pharmacological abortion are safe methods in early pregnancy; sharp curettage is inferior and should be abandoned. For later abortions, either dilation and evacuation or labour induction are appropriate. Hysterotomy should not be used. Timely and appropriate management of complications can reduce morbidity and prevent mortality. Treatment delays are dangerous, regardless of their origin. Misoprostol may reduce the risks of unsafe abortion by providing a safer alternative to traditional clandestine abortion methods. While the debate over abortion will continue, the public health record is settled: safe, legal, accessible abortion improves health.

Introduction

The tragedy of unsafe abortion goes largely unnoticed, a silent scourge in developing countries. Were a jumbo jet carrying 400 women of reproductive age to crash today in Central Africa, with loss of all lives on board, the response would be prompt and predictable. International press coverage would start within hours, with television crews and teams of investigators pouring over the smoking wreckage in search of the cause. Reporters would dutifully interview grieving relatives. Imagine the global response if yet another identical jet, loaded to capacity with women younger than 45 years, met the same fate a few days later in Southeast Asia. Then another in South America. And another in the Caribbean. Suppose that, over a year, 168 such airliners went down, killing all on board. How long would governments of the world allow such an airplane to fly before demanding corrective action?

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Burden of suffering

Year in and year out, this many women (about 70,000) die of complications of unsafe abortion[1]. An estimated 19 million desperate women each year risk degradation, disease and death through such abortions[2]. The response of the international community remains muted, perhaps in part because the victims are all women, they are mostly of colour, and they live in developing countries. They die in places like Ouagadougou, not Oslo. Their deaths are all the more tragic, since nearly all are preventable.

More is known today about the epidemiology of legally induced abortion than any other operation. In contrast, huge gaps persist in our understanding of the incidence, morbidity and mortality of unsafe abortion. Because of stigma[3] or fear of legal reprisals, unsafe abortions are grossly under-reported, and the complications thereafter are often concealed or attributed to spontaneous miscarriage. For example, a recent hospital study from Ethiopia reported that 86% of abortions were spontaneous, yet the mean gestation age at admission was 15 weeks, an improbable scenario[4].

Despite gross under-reporting (due in part to deaths outside of hospital), unsafe abortion remains one of the five leading causes of maternal death in most developing countries[5–9]. For every woman who dies, many more are left wounded, some with life-long consequences, including infertility, chronic pelvic pain and genital trauma.

Through the leadership of the World Health Organization, several important publications in recent years have addressed the complex issue of unsafe abortion and its remedies. These include review articles[1,10], books[11] and the May 2002 issue of *Reproductive Health Matters*. Since the social and political approaches to the problem of unsafe abortion have been explored in detail in these references, I will focus on the medical aspects. This article will review the scope of the problem and address strategies for prevention and treatment of unsafe abortion and its sequelae.

Definition

'Unsafe abortion' is defined by the World Health Organization as 'a procedure for terminating an unwanted pregnancy either by persons lacking the necessary skills or in an environment lacking the minimal medical standards or both'[2]. Of note, 'unsafe' is not a synonym for 'illegal' or 'clandestine'. For example, legal abortions may be unsafe because of poorly trained clinicians, inadequate facilities, or both.

Potential solutions

Legalization of abortion

Legalization of abortion can dramatically improve women's health. Several natural experiments reveal the potential. In the USA, for example, the legalization of abortion led to the emptying and then closing of septic abortion wards in major metropolitan hospitals[12]. On a nationwide basis, deaths from illegal abortion nearly disappeared within a few years of nationwide legalization[13].

The opposite was observed in Romania after abortion was made inaccessible by the dictator Ceaucescu. Birth rates remained stable, but maternal mortality rates soared to the highest in Europe. Women resorted to unsafe abortion to control their fertility, and many died. When Ceaucescu was deposed and abortion again became accessible, maternal mortality rates plummeted[14].

More recently, Poland severely restricted abortion after decades of easy access. The result has been an estimated 80,000–200,000 clandestine abortions annually, women travelling to other countries for service, an increase in the cost of abortion, and no change in birth rate[15]. Clearly, the public health has suffered as a result.

Legalization of abortion, although important, is insufficient. India has had legal abortion on the books for several decades, as has Zambia. However, the 'devil is in the details'. In both countries, numerous impediments to care, ranging from requirement for several doctors' signatures to lack of accessible clinics, prevent most women in need from getting care in a timely fashion[10]. Hence, women continue to rely on unsafe abortion to control their fertility.

A companion article in this issue recounts the South African experience. A recent analysis of the public health impact of legalization of abortion in 1997 found little benefit. However, the low uptake (abortion ratio 36 per 1000 live births; abortion rate 3 per 1000 women aged 12–49 years)[16] suggests a large unmet need for safe, legal abortion. By comparison, the corresponding abortion ratio and rate for the USA are 264 and 17, respectively[17]. Hence, many women in South Africa probably still resort to unsafe practices[18].

Improving access

Removing needless barriers to abortion is fundamentally important. In the USA, for example, the response of general hospitals to the nationwide legalization of abortion in 1973 was tantamount to default; even today, most do not provide abortions. Out of this service vacuum arose free-standing

abortion clinics, which now provide most abortions in the USA. They offer greater convenience, lower costs and greater safety than do hospitals[19].

Women in developing countries often must run a gauntlet to get a safe abortion. Problems include the metropolitan concentration of abortion providers, consent to contraceptive sterilization as a prerequisite, lack of an appointment system and hefty charges for services that should be free[10]. Lack of confidentiality of providers regarding minors poses another obstacle for adolescents. Even in India, where abortion has been legal for three decades, most women in one survey were unaware that it was legal[20].

Improving clinical care

Abortion providers vary widely in both quantity and quality. Even where abortion is legal, providers may be limited in both number and in skill. Many clinicians have little training for induced abortion. Experience with spontaneous abortion, where the cervix is often dilated, is not analogous to induced abortion. Many clinicians continue to use obsolete instruments, such as the metal curette. Moreover, limited evidence suggests that mid-level clinicians, such as physician's assistants and midwives, are competent to provide not only care of complications[21] but also to perform first-trimester abortions themselves[22].

Upgrading facilities

Simple, inexpensive equipment is needed for providing abortion services and caring for most complications that occur. Elaborate operating theatre set-ups and availability of general anaesthesia, required by some bureaucracies as a prerequisite for licensing[20], are inappropriate. Provided that arrangements and transportation (*e.g.* a jeep-taxi in rural India or a speedboat in Bangladesh) are in place for quickly moving patients to hospitals, if needed, free-standing abortion clinics around the world have achieved an outstanding safety record. Although abortion equipment is simple, it must be available. A major barrier to care in many developing countries is the lack of basic equipment and drugs for all gynaecological care[23].

Legal abortion in the first trimester: lessons learned

Determinants of safety

Two principal determinants of the safety of legally induced abortion are gestational age and choice of method. Both are closely interrelated. Abortion morbidity as a function of gestational age plots as a 'J'-shaped

curve. The nadir for complication rates by vacuum aspiration occurs at 7–10 weeks from last menses. Among first-trimester surgical procedures, suction curettage is superior to sharp curettage in speed, comfort and safety. The metal curette, introduced in 1843 by Recamier to 'scrape off uterine fungosities'[24], sparked an immediate, strident debate. Scanzoni protested that the metal curette was 'an instrument based on an entirely erroneous thought, which takes from it all practical utility'. A century and a half later, solid evidence supports Scanzoni's dim view of the metal curette; it should be relegated to museums.

Anaesthesia

Local anaesthesia is safer than general anaesthesia for early abortion; it is cheaper as well. Indeed, in some countries, general anaesthesia is the leading cause of death from early abortion. However, local anaesthesia is not without risks. Toxicity and occasional deaths can occur if clinicians exceed safe doses of local anaesthetic agents, especially those of the amide class (lignocaine family). In the USA, no deaths have been attributed to local anaesthesia with ester anaesthetics (procaine family), although their use is less common. In general, clinicians should use the smallest amount of the lowest concentration adequate for the purpose. For example, 1% lignocaine is one of the more toxic local anaesthetic agents; using a 0.5% solution provides excellent anaesthesia with a wider margin of safety.

Cervical priming

Cervical preparation for surgical abortion can facilitate the operation. Osmotic dilators, such as naturally occurring laminaria or synthetic devices made of polyvinyl alcohol sponge impregnated with magnesium sulphate or hygroscopic plastic, have been used selectively. In recent years, misoprostol has gained wide use for this purpose. A dose of 400 μg given vaginally 2–3 h before the planned operation provides dilation that is often adequate to perform early suction curettage[25]. Should subsequent dilation be required, tapered dilators of the Pratt or Denniston design require much less force than do Hegar dilators[26]. Hegar dilators, like metal curettes, are antiques from the 19th century.

Tissue inspection

Formal pathology examination of the uterine contents is unnecessary. In contrast, visual inspection of the aspirate by the clinician or a designee is mandatory before the patient leaves the facility. A number of women have

died from unsuspected ectopic pregnancies in this setting. Confirmation of the appropriate type and volume of tissue excludes ectopic pregnancy (except for the rare ectopic twin) as well as failed attempted abortion. The requisite equipment is simple: a source of back-lighting (such as a horizontal X-ray viewing box), a mesh kitchen strainer and a shallow transparent dish (like that used for baking pies). When the rinsed tissue is suspended in water and examined with back-lighting, this simple set-up allows immediate identification of embryonic tissue as early as 5 weeks and recognition of molar pregnancy as well.

Pharmacological approaches

Pharmacological abortion has transformed the landscape over the past decade. In recent years, the term for drug-induced abortion in early pregnancy has been 'medical' abortion. This ambiguous term has caused needless confusion and thus needs to be replaced with a more descriptive term. For example, in many cultures, 'medical' abortion implies that performed by medical personnel, such as physicians or midwives. Thus, in some countries, a vacuum aspiration performed by a physician would be deemed a 'medical' abortion, as compared with an abortion induced by a lay person.

Several approaches to pharmacological abortion are used, depending on the local availability of drugs. The best appears to be the combination of mifepristone followed by misoprostol. A popular regimen includes an oral dose of mifepristone 200 mg by mouth followed 1–3 days later with vaginal misoprostol, up to 800 μg. The optimal regimen has not been established, and research is under way to evaluate different doses and routes of administration (*e.g.* buccal or sublingual misoprostol). Regimens of mifepristone and misoprostol have been found safe and effective in both developed and developing countries[27].

Where mifepristone is not available, another alternative is methotrexate 50 mg/m^2 as a single intramuscular injection, followed some days later by misoprostol. This rivals the success of mifepristone–misoprostol, although the process is slower. Although many clinicians use blood tests to ensure normal liver function before administering single-dose methotrexate, the necessity of this practice is unclear. Another option more widely available is misoprostol alone. Reports suggest that the success of this approach is not as high as with the combined drug regimens, and gastrointestinal toxicity and fever become problems with repetitive doses[28].

Ancillary measures

Several ancillary measures lower morbidity as well. All patients having vacuum aspiration abortions should receive prophylactic antibiotics,

although the optimal regimen remains unclear[29]. Doxycycline is popular, given its low cost, high safety and wide spectrum. Rh-negative women should receive Rh immunoglobulin.

Midtrimester legal abortion: lessons learned

Surgical abortion

Second-trimester abortion can also be performed surgically or pharmacologically. Through about 16 weeks, dilation and evacuation (D&E) is superior to labour-induction abortions. The comparative safety and acceptability of D&E *versus* labour-induction abortion at later gestational ages are currently unknown. Studies with abortifacients no longer used, such as intra-amniotic $PGF_{2\alpha}$, showed that D&E was superior to labour induction. One recent cohort study from a US hospital showed D&E to be significantly safer than labour-induction abortion, but selection bias was evident[30]. Randomized controlled trials comparing contemporary regimens with D&E are needed to resolve this question. D&E has several appealing features for developing countries, including reducing reliance upon scarce hospital beds and resources[31].

Pharmacological abortion

Several pharmacological approaches are used for labour induction. Intra-amniotic instillation of hypertonic saline (200 cc of 20%) or urea (80 g) remain safe and effective regimens. Augmentation by oxytocin, prostaglandin and osmotic cervical dilators shortens abortion times greatly. An advantage of hypertonic abortifacients is the lower risk of an abortus with signs of life; a disadvantage is a small risk of coagulopathy.

Uterotonic agents alone are effective abortifacients. One alternative is high-dose intravenous oxytocin, given in increasing concentrations[32]. This avoids the gastrointestinal distress associated with prostaglandins but requires many vials of oxytocin, which may be prohibitively expensive in developing countries. With scheduled breaks in the oxytocin infusion, water intoxication is avoided. Misoprostol alone, given by different routes and in different doses, can be effective as well[33]. An advantage is the low cost and wide availability of misoprostol; a disadvantage is dose-related gastrointestinal side-effects and fever. In countries where available, mifepristone administered before uterotonic agents dramatically reduces induction-to-abortion times.

Unsafe abortion

Choice of methods

The range of abortion methods used varies widely in safety and efficacy. Oral abortifacients have included quinine, ampicillin, laundry bluing, turpentine, bleach, acid, tea made of livestock faeces and other vegetable concoctions. Potassium permanganate tablets and herbal preparations have been used vaginally. Foreign bodies inserted through the cervix include sticks, roots, wires, knitting needles, coat hangers, rubber catheters and bougies, ball-point pens, bicycle spokes and chicken bones[34]. The last foreign body has led to unexplained infertility[35]. Physical methods have included abdominal massage[36], and lifting of heavy weights.

In the past, more invasive methods, *e.g.* introducing foreign bodies into the uterus, were more effective in producing abortions. They also tended to carry greater risks of trauma and infection. In one study from the Ivory Coast, plant infusions carried a high risk of neurotoxicity and maternal death, while intrauterine approaches were related to peritonitis[37].

Access to misoprostol has changed the landscape of unsafe abortion in several ways. First, it provides safe entrée into medical care. In many countries where legal abortion is not available, women induce vaginal bleeding by inserting a foreign body through the cervix. Once a diagnosis of 'spontaneous' incomplete or inevitable abortion is made, the woman can have a uterine aspiration with appropriate medical care. Misoprostol can cause such bleeding without the risk of instrumentation. In one report from Brazil, the infection rate associated with misoprostol was significantly lower than that with alternative traditional methods[38]. Second, if given in sufficient doses and with sufficient frequency, misoprostol alone can abort a high proportion of pregnancies.

Types of providers

A broad array of personnel perform unsafe abortions. Aside from the woman herself, others include physicians working at clandestine sites or in hospital operating theatres after hours. Others with medical experience include midwives, traditional birth attendants, pharmacists and nurses. Most worrisome are 'untrained quacks' whose motives may be financial and their skills negligible[39,40].

Ancillary measures

While the benefit of prophylactic antibiotics for vacuum aspiration has been established, the advisability of prophylaxis after other types of abortion is

unclear. A recent Cochrane review has found the evidence too sparse to reach a conclusion[41]. Rh immune globulin should be given as indicated.

Treatment of complications

Incomplete abortion

The treatment of incomplete abortion is uterine evacuation. For decades, the assumption was that surgical removal was necessary. For first-trimester spontaneous abortion, that tenet has been challenged. Watchful waiting (expectant management) may be preferable, both in terms of emotional and physical welfare[42].

Alternatively, oxytocin has been used for decades to help expel tissue. More recently, misoprostol has attracted great attention as a uterotonic agent in this setting. A randomized controlled trial comparing surgical evacuation *versus* pharmacological evacuation with misoprostol found the latter to have fewer immediate complications; however, about half of those randomized to receive misoprostol later required surgical treatment. A Cochrane review in progress will compare expectant management with surgical intervention of miscarriage; another will compare medical (pharmacological) management of miscarriage.

Should surgical intervention be elected, suction curettage is preferable to sharp curettage[41]. Vacuum aspiration (suction curettage) with either an electrical pump or syringe as vacuum source is the standard of practice. For management of incomplete second-trimester abortion, pharmacological agents or surgical evacuation are options. Specially designed grasping forceps for D&E procedures, such as the Bierer or Sopher forceps, can quickly empty a large uterus, whereas labour-induction methods may take hours. Time can be critical when severe infection or heavy bleeding occurs. Hysterotomy to produce abortion (or to manage abortion) is an obsolete operation. This approach is needlessly risky, painful and expensive. Alternative means of emptying the uterus are preferable.

Haemorrhage

While oxytocic agents can assist, the definitive treatment of haemorrhage usually is to empty the uterus. Should uterine trauma or coagulopathy be responsible, specific treatment is indicated. More commonly, however, the task is to remove remaining tissue and help the uterus contract. Massage of the uterus, or firm, sustained compression between a vaginal and abdominal hand, can help temporize.

Should surgical evacuation be necessary, this should not be delayed to allow for correction of anaemia. Young, healthy women tolerate

operations with very low haematocrits. Prompt resuscitation with volume expanders, rather than red cells, and rapid transfer to the operating theatre are appropriate. Although colloids, such as albumin, dextran 70, hydroxyethyl starches and plasma protein fraction, have been widely recommended for fluid resuscitation, a Cochrane review found them of comparable benefit to crystalloids, which are much less expensive. Hence, the latter should be used[43].

Infection

As with most gynaecological infections, the microbiology of post-abortal infection reflects the resident flora in the lower genital tract. Hence, antibiotic coverage should include Gram-positive organisms, Gram-negative rods and anaerobes. Some women will have involvement with sexually transmitted pathogens. When foreign bodies are involved, *Clostridium perfringens* needs to be considered as well.

Antibiotic coverage will depend on local availability, but two-drug therapy should be considered for serious infections. Examples include those mentioned by the Centers for Disease Control and Prevention for treatment of pelvic inflammatory disease, such as cefotetan plus doxycycline, or gentamicin plus clindamycin. Parenteral therapy is preferred, although if gut function is adequate, doxycycline can be administered orally with excellent serum levels obtained. Should the patient not respond appropriately, the possibilities of retained tissue, perforation, abscess formation and bowel injury need to be considered and evaluated.

A common practice in some developing countries is to allow several days of antibiotic therapy (sometimes only oral tetracycline) for clinical improvement before removal of retained tissue. Based on considerable indirect evidence[37,40,44], this delay appears dangerous. Serum levels of antibiotics will be achieved within an hour, and if the patient has stable vital signs, she should undergo evacuation promptly. The mainstay of treatment is emptying the uterus, and antibiotics will not succeed until the necrotic, infected tissue is removed. The common theme in fatal septic abortion is delay: delay in recognition, delay in getting to care, then delay in initiating care upon arrival.

Septic shock

Septic shock remains an important cause of death from unsafe abortion. The cornerstones of management include treatment of infection and cardiovascular support. For example, adult respiratory distress syndrome develops in one-quarter to one-half of such patients, and this complication itself carries a high risk of death. High-dose, broad-spectrum

antibiotics are indicated; no evidence indicates that triple antibiotics are preferable to two drugs.

Recently published systematic reviews have examined several ancillary treatments of sepsis and septic shock. Corticosteroids appear worthless and, indeed, may be harmful. They should not be used[45]. Naloxone[46] and intravenous polyclonal immunoglobulin[47] appear promising, but more research is needed. Drotrecogin alpha also improves survival in severe sepsis, but is expensive[48].

Should the patient not respond, laparotomy is advisable. Similarly, abdominal exploration is usually indicated for uterine perforation with suspicion of organ injury, clostridial myometritis with intramural gas formation and suspected or confirmed pelvic abscess.

Bowel trauma

Bowel injury is a common consequence of uterine perforation, either with pointed instruments or grasping forceps. The distal ileum appears to be most vulnerable to injury, followed by the sigmoid[49]. Figure 1 depicts small

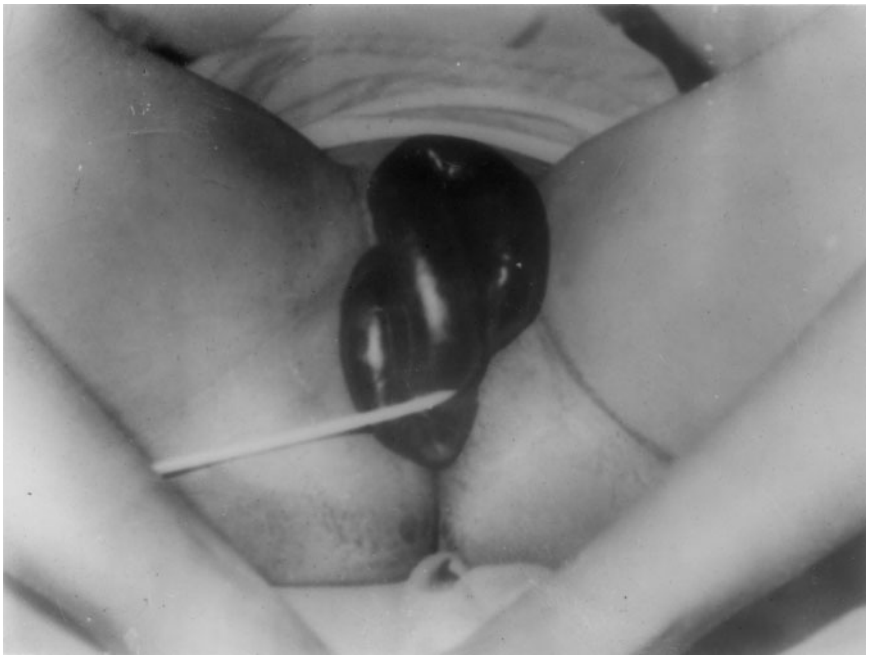

Fig. 1 Loops of gangrenous small intestine protruding from the vagina, 20-year-old patient at 16 weeks' gestation, Lagos University Teaching Hospital, Lagos, Nigeria. Reproduced from Oye-Adeniran BA, Umoh AV, Nnatu SSN. Complications of unsafe abortion: a case study and the need for abortion law reform in Nigeria. Reproduced from *Reprod Health Matters* 2002; **10**: 18–21 with permission from Elsevier.

bowel herniated through a perforation of the utero-vesical space during an attempted midtrimester abortion; the uterus was intact. Resection and reanastomosis of the necrotic bowel were required to save the patient's life.

Injuries of the colon are easier to recognize than are small-bowel injuries, because of prompt peritoneal soiling. A normal or declining white blood count can be deceiving—a harbinger of septic shock. In general, any woman with abdominal pain after uterine instrumentation should be considered to have a perforation with bowel injury until proven otherwise. In the face of faecal contamination and severe peritonitis, colorectal injuries should not be repaired primarily. Diverting colostomy with take-down some months later is prudent. Patients should be advised about and consented for colostomy whenever a laparotomy is performed in this setting. As with other contaminated cases, the wound should have a delayed primary closure.

'Too little, too late'

Lack of training, unfamiliarity with treatment options, out-of-stock drugs, broken equipment, sporadic electricity and water, and transportation challenges all threaten the health of women grappling with unsafe abortion[23]. Perhaps the greatest danger of all is indifference—or overt disdain.

The lack of commitment on the part of medical and nursing staff to provide prompt, attentive and emotionally supportive care indirectly dooms women whose lives could easily be saved. Many women who reach medical facilities are met with suspicion and hostility, and their treatment deferred while other more 'suitable' candidates receive medical attention[10]. When dealing with patients in need, judgemental behaviour on the part of health care personnel is both medically dangerous and ethically indefensible.

While the debate over the role of abortion in society will continue unabated, the public health record is clear[13]. Safe, legal and accessible abortion improves the health of women and their families. When medical historians look back upon our era, the legalization of abortion will stand out, along with the development of antibiotics and immunization, as a public health triumph.

Table 1 Suggested websites on abortion

http://gynpages.com/	Abortion clinics on-line
http://www.acog.com/	American College of Obstetricians and Gynecologists
http://www.cdc.gov/	Centers for Disease Control and Prevention
http://www.crlp.org	Center for Reproductive Law and Policy
http://www.guttmacher.org/	Alan Guttmacher Institute
http://www.ipas.org/	Ipas
http://www.popcouncil.org/	The Population Council
http://www.prochoice.org/	National Abortion Federation
http://www.rcog.org.uk/	Royal College of Obstetricians and Gynaecologists
http://www.who.int/en/	World Health Organization

Table 2 Key points for clinical practice

- Legalization of abortion is temporally associated with profound improvements in women's health, and vice versa
- Vacuum aspiration or pharmacologic methods are safe and effective for early abortion
- Sharp curettage is obsolete and should be abandoned
- Misoprostol given before vacuum aspiration primes the cervix for operation
- Prophylactic antibiotics should be given to all women having vacuum aspiration; evidence is insufficient concerning miscarriage and unsafe abortion patients
- Delays in treating complications of unsafe abortion further compromise safety
- Crystalloids are preferable to colloids for volume expansion
- Corticosteroids are worthless in septic shock; drotrecogin alpha improves survival
- Any woman with abdominal pain after an abortion should be considered to have a uterine perforation with bowel injury until proven otherwise

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