

Original research article

# Provision of medical abortion by midlevel healthcare providers in Kyrgyzstan: testing an intervention to expand safe abortion services to underserved rural and periurban areas<sup>☆,☆☆,★,★★</sup>

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## Abstract

**Objective:** To demonstrate the feasibility and safety of training midlevel healthcare providers (midwives and family nurses) to provide medical abortion and postabortion contraception in underserved areas in Kyrgyzstan.

**Study design:** This was an implementation study at four referral facilities and 28 Felsher Obstetric Points in two districts to train their midwives and family nurses to deliver safe and effective abortion care with co-packaged mifepristone–misoprostol and provide contraceptives postabortion. The outcome of abortion — complete abortion, incomplete abortion or o-going pregnancy — was the primary end point measured. An international consultant trained 18 midwives and 14 family nurses (with midwifery diplomas) to provide medical abortion care. Supervising gynecologists based in the referral centers and study investigators based in Bishkek provided monthly monitoring of services and collection of patient management forms. A voluntary self-administered questionnaire at the follow-up visit documented women's acceptability of medical abortion services. All study data were cross-checked and entered into an online data management system for descriptive analysis.

**Results:** Between August 2014 and September 2015, midwives provided medical abortion to 554 women with a complete abortion rate of 97.8%, of whom 62% chose to use misoprostol at home. No women were lost to follow-up. Nearly all women (99.5%) chose a contraceptive method postabortion; 61% of women receiving services completed the acceptability form, of whom more than 99% indicated a high level of satisfaction with the service and would recommend it to a friend.

**Conclusion:** This study demonstrates that trained Kyrgyz midwives and nurses can provide medical abortion safely and effectively. This locally generated evidence can be used by the Kyrgyz Ministry of Health to reduce unintended pregnancy and expand safe abortion care to women in underserved periurban and rural settings.

**Implications:** Success in scaling up midwife/nurse provision of medical abortion in Kyrgyzstan will require registration of mifepristone–misoprostol, regulations permanently allowing midwife/nurse provision, strengthened procurement and distribution systems to prevent

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stockouts of supplies, preservice training of midwives/nurses and their involvement in district level supervision, monitoring and reporting, and support from supervisors.

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**Keywords:** Abortion; Medical abortion; Midwives; Nurses; Midlevel providers; Kyrgyzstan

## 1. Introduction

Research has shown that trained midwives and nurses can provide medical abortion as safely as trained physicians; they can help to expand the provider base in resource-poor settings, thus reducing inequities in access; and they can help to improve the quality and reduce the costs of safe abortion care [1–6]. Based on the strength of existing evidence, in 2015, the World Health Organization (WHO) reiterated the safety of medical abortion provided by midwives, nurses, and other midlevel providers through recommendations and guidance on health worker roles in providing safe abortion care [7].

In 2009, the Kyrgyzstan Ministry of Health requested WHO and UNFPA support to address the problem of morbidity and mortality related to unsafe abortion. The request led to a strategic assessment on prevention and care for unintended pregnancies conducted in 2011. A strategic assessment is Stage I of the *WHO Strategic Approach to Strengthening Sexual and Reproductive Health Policies and Programmes* [8]. It is a country-led process that facilitates a national team to identify and prioritize needs and potential follow-up actions related to improving sexual and reproductive health and rights, such as prevention of unintended pregnancy and unsafe abortion. The approach provides the foundation for planning, developing and testing policy and service delivery options (Stage II), and scaling-up national programs (Stage III). It aims to generate information, understanding and consensus about sexual and reproductive health and rights needs as well as a national mandate for addressing them.

The 2011 strategic assessment found that women in underserved areas of Kyrgyzstan had limited options for safely terminating unwanted pregnancies, often involving travel over long distances to access safe services. One of the priority recommendations of the assessment was to train local midwives and nurses to provide medical abortion in order to extend safe abortion care to women living in these areas.

## 2. Materials and methods

### 2.1. Study background

The Kyrgyz Republic gained independence from the former Soviet Union in 1991. The population of nearly 6

million people is young, with a median age of 25; 36% of the total population live in urban areas and 64% live in rural areas [9]. The educational level is high, with 96% having some secondary education [10]. Life expectancy at birth in 2014 was 71 years: 75 years for women and 67 years for men [10]. The maternal mortality ratio in 2015 was estimated to be 76 deaths per 100,000 live births [11]. Reliable data on morbidity and mortality from unsafe abortion in Kyrgyzstan are unavailable.

Abortion on a woman's request without restriction as to reason is available in Kyrgyzstan up to 12 weeks' gestational age and for economic and social reasons up to 22 weeks. Under the current law, all abortions must be provided by an obstetrician–gynecologist in a public or private medical institution [12]. The Ministry of Health gave temporary authorization for midwives and family nurses to provide medical abortion during the research study.

Contraceptives made available during the study — condoms, pills, intrauterine devices (IUDs), Depo-Provera® — reflected what was affordably available in pharmacies or through humanitarian assistance. Other contraceptives, such as subdermal implants, were not included due to their high cost and irregular availability. Eleven midwives from Suzak District had been previously trained to insert IUDs; untrained midwives/nurses referred women wanting an IUD to the supervising gynecologist.

In Kyrgyzstan, midwives must pass a 3-year course in a medical college with practical skills training at primary care family medicine centers and maternity hospitals. Midwives are trained to provide family planning, including hormonal contraceptives and Depo-Provera®. Training also includes monitoring of pregnancy, labor management and delivery, and postpartum care. Family nurse training involves a 2-year course with practical training in outpatient clinics. The nursing course covers many of the same topics as for midwives, excluding management of labor and delivery. Although not a requirement of the Ministry of Health, all family nurses that participated in the project also had a midwifery diploma.

The World Bank and other international organizations supported implementation of the National Health Care Reform Programme “Manas” from 1996 to 2000. Manas focused on strengthening primary healthcare through the establishment of family medicine centers, family group practices and Felsher Obstetrics Points (FOPs). FOPs serve high-risk poor families living in periurban neighborhoods

and isolated rural communities, providing antenatal and postpartum care, emergency obstetric care, information and counseling on reproductive health, family planning and child health. FOPs serve catchment areas of 1500–6000 people.

### 2.2. Study design, ethical approval, informed consent and liability coverage for midwives

This was an implementation study to demonstrate that trained midwives and family nurses can provide safe and effective abortion care with the combination mifepristone–misoprostol, as recommended by WHO. A total of 32 midwives and family nurses (1 per study site) were trained in 2 referral centers and 14 linked FOPs in Suzak District, Jalal-Abad Oblast, and 2 referral centers and 14 linked FOPs in Alamudun District, Chui Oblast.

The HRP Research Project Review Panel, the WHO Research Ethics Review Committee and the Bioethics Committee of the Kyrgyz Ministry of Health reviewed and approved the study. A special Ministry of Health Order (No. 263, dated 20 May 2013) allowed midwives and nurses to provide medical abortion in the selected health facilities during the study.

An international consultant trained all participating midlevel providers in provision of mifepristone–misoprostol based on the regimen recommended by WHO [13]. All of them were provided with Medabon® (a co-packaged mifepristone–misoprostol product), nonsteroidal anti-inflammatory drugs, Frautest Express® pregnancy tests (manufactured by BOLEAR, Ltd., Moscow), contraceptives (pills, condoms, injectables and IUDs), and mobile cell phones and cell phone credits (demonstrated successfully in other medical abortion studies [14,15]) to facilitate follow-up contact with patients. Information leaflets announcing the services were printed and distributed in the local communities. The study was conducted between August 2014 and September 2015.<sup>1</sup>

A midwife or family nurse provided information on safe abortion options to all women requesting abortion; the women could then choose between vacuum aspiration and medical abortion and whether to receive care from a midwife/nurse or a gynecologist. Those who opted for vacuum aspiration and those who opted for medical abortion from a gynecologist were referred and not included in the study; they were charged 190 KGS (approx. US\$3.00) for their abortion care according to the official government price list.

The women who chose medical abortion with a midwife/nurse were given an informed consent form to sign, as

required by law, with comprehensive information on the method. They also gave verbal consent to allow the linkage of anonymized medical data to a numerically coded, voluntary acceptability form. All participant information was coded and individual identifiers removed.

The midwives/nurses provided preabortion counseling, assessed gestational age<sup>2</sup> and eligibility for medical abortion, provided Medabon® and conducted in-clinic follow-up in both the referral centers and FOPs. Throughout the duration of the project, the Medabon® provided by midwives/nurses was free of charge.

They also gave detailed information during the counseling process about contraceptive methods (condoms, pills, IUDs, Depo-Provera®) and their side effects using flip charts and samples of the methods.

The outcome of the abortion — complete abortion, incomplete abortion or ongoing pregnancy — was the primary study end point. The study also documented participant characteristics, referrals to higher-level care and acceptance of contraception postabortion. Women who agreed to do so completed a self-administered questionnaire on a voluntary basis at the end of the follow-up visit regarding the acceptability of the medical abortion service.

### 2.3. Study inclusion and exclusion criteria

Study inclusion criteria included the following:

- Woman's desire to have medical abortion managed by a midwife/nurse;
- Gestational age not more than 63 days, as estimated by woman's account of last menstrual period, a gynecological exam and/or ultrasound;
- Woman's willingness to return to the clinic for a follow-up visit between days 7 and 14;
- Residence within the geographical catchment area specified for the site;
- Willingness to provide informed consent for the medical procedure;
- Capacity to understand the nature of the study and the advice and instructions given by the healthcare providers; and
- Woman's access to a telephone to call the service provider and be contacted if necessary.

Study exclusion criteria, which are standard for provision of medical abortion, included:

- Previous allergic reaction to either mifepristone or misoprostol;

<sup>1</sup> The study protocol called for a 9-month recruitment period; however, due to a lengthy delay in finalizing the study methodology, the medical abortion intervention had to be suspended from November 2014 due to the expiration of the first batch of Medabon®. Although a new order of Medabon® was made well in advance of the expiration date, the company, Sun Pharmaceutical Ltd., was unable to fill the order for 8 months due to their involvement in a corporate takeover action and subsequent closure of production lines. All midwives received refresher training as soon as the new batch of Medabon® became available in April 2015.

<sup>2</sup> Felsler Obstetric Points are not equipped with ultrasound equipment, and use of ultrasound was not a study objective. A total of 223 of 554 women applied for abortion with ultrasound results in hand; 226 of the remaining 331 women were referred for ultrasound to confirm gestational age prior to medical abortion.

- Known or suspected ectopic pregnancy<sup>3</sup> or undiagnosed adnexal mass;
- Long-term corticosteroid therapy;
- Hemorrhagic disorder or anticoagulant therapy (blood thinner medications);
- Intrauterine device in utero that could not be removed before taking mifepristone;
- Unwilling or unable to return to clinic for follow-up visit.

Breastfeeding is not a contraindication for medical abortion as there is no evidence that infants are harmed by the drugs. However, although the drugs are rapidly metabolized, they may enter breast milk in small amounts [16]. Therefore, service providers advised women to discard any breast milk produced in the hours following each dose of medication.

#### 2.4. Study enrolment

All women requesting medical abortion had their data recorded by the midwife/nurse on a recruitment log and a specially designed, coded participant management form. Women requesting and eligible for medical abortion took the mifepristone pill at the clinic and chose between either receiving misoprostol to take at home 24–48 h later or returning to the clinic after 24–48 h to take it. Women using misoprostol in the clinic were given the option of remaining there for a 4–6-h observation period or returning home to expel the products of conception. All women took misoprostol sublingually. All women received a nonsteroidal anti-inflammatory drug such as ibuprofen or diclofenac for pain medication.

#### 2.5. Follow-up visit

All midwives received a mobile phone and/or mobile phone credits to ensure that they could contact and be contacted by women who received the service. All women were asked to return for follow-up with the midwife/nurse between 7 and 14 days following the abortion. During the follow-up visit, the midwife/nurse confirmed the abortion outcome through an interview with the woman (specifically asking if she had seen the products of conception) and administration of a urine-based pregnancy test. She also provided the woman's choice of contraceptive method during the follow-up visit. Service providers not trained in IUD insertion referred women wanting an IUD to the supervising gynecologist.

Midwives who suspected incomplete abortion could call the gynecologist supervisor and/or make a referral. Women with incomplete abortion were offered repeat dosing with misoprostol or manual vacuum aspiration (MVA). Women with ongoing pregnancies received an MVA.

When follow-up was completed, women were invited to complete the questionnaire about their abortion experience, either in the clinic or at home, place the completed form in a sealed envelope and deposit it in a designated box for monthly collection by the study supervisor. Midwives/nurses provided clarifying information about the form only when requested by the woman. The form included the following statements/questions, framed with agree–disagree or yes–no response options:

- The method was clearly explained to me before I took the tablets. (agree/disagree/not sure)
- It is convenient and easy for me to get medical abortion care from a midwife at a nearby clinic. (agree/disagree/not sure)
- Did you receive sufficient information from your midwife to decide which contraceptive to use? (No/Yes/Did not want or need a contraceptive)
- If a friend needed an abortion, would you recommend she also come to a midwife? (No/Yes/Not sure)

#### 2.6. Monitoring and supervision

The attending midwife/nurse completed all case reporting forms. Each district had two supervisors. These women made monthly visits to each service delivery point to cross-check and collect the data management forms, answer questions and discuss a range of service delivery issues. All study forms were cross-checked twice in the field, once by the supervisor and once by the Bishkek-based project coordinator, prior to being submitted to the data manager for data entry. The principal investigator, co-investigators and on one occasion the technical lead from WHO headquarters made periodic monitoring visits to interview selected midwives/nurses about their experiences, answer questions about particular cases and the data collection process, and provide general troubleshooting.

#### 2.7. Data management

The data manager reviewed all study forms prior to data entry into the web-based data management system *Open-Clinica* (<https://www.openclinica.com/>) Copies were retained by the field sites and the original kept by the data manager in Bishkek. PDFs of the data forms were made and sent to WHO headquarters. The WHO data analyst generated queries and resolved all data-entry questions with her counterpart in Kyrgyzstan. The former technical lead of the Statistics and Information Systems unit in the WHO Department of Reproductive Health and Research conducted the data analysis.

Data analysis involved producing descriptive statistics for all questions on the participant management form and selected questions from the acceptability form. All data were stratified and presented by study district.

<sup>3</sup> Ectopic pregnancy was ruled out through interview, general examination including vaginal examination and ultrasound for any suspected cases.

### 3. Results

#### 3.1. Study recruitment and participant characteristics

During the study period, 749 women presented to a midwife/nurse for an abortion. A total of 554 women were recruited into the study — 220 women in Alamudun and 334 in Suzak. Approximately one-quarter of the remainder did not meet the inclusion criteria for medical abortion listed in Section 2.3, almost all because they were beyond the gestational age limit. Almost half of the rest preferred to have vacuum aspiration instead of medical abortion, 13% preferred to receive medical abortion from a gynecologist, 5% decided to continue the pregnancy, and 3% were not pregnant (See Table 1).

No women were lost to follow-up. Midwives/nurses conducted follow-up in person with all but one woman, who was interviewed by telephone.

The mean age of study participants was 31 years, with a range between 17 and 47 years. The mean number of previous pregnancies was 3.8. The mean gestational age of the index pregnancy was 42 days. Two-thirds (66%) of women sought medical abortion from a midwife/nurse at a FOP and the remaining one-third from a midwife/nurse at a referral center.

#### 3.2. Procedure outcomes

Of the 554 participating women, 97.8% had a complete abortion (215 or 97.7% in Alamudun and 327 or 97.9% in Suzak), 1.8% had an incomplete abortion, and 0.4% (2 women) had ongoing pregnancy. Both ongoing pregnancies were investigated. In one case, the woman vomited within 10 min of taking mifepristone and again 10 min after taking misoprostol. She later experienced a small amount of bleeding and called the midwife to report that she had expelled the pregnancy; 12 days later, she had an ultrasound that confirmed she was still pregnant with twins. She was offered vacuum aspiration but decided instead to keep the pregnancy. In the second case, the woman had not expelled the pregnancy 2 days after taking misoprostol. She was offered a repeat dose of misoprostol but declined and requested MVA.

Table 1

Study recruitment data, participant age, pregnancy duration, location of service delivery

Characteristic	Alamudun	Suzak	Total
Women requesting abortion	246	503	749
Women recruited into the study	220	334	554
Mean age (SD)	29.0 (5.6)	31.9 (6.5)	30.7 (6.3)
Mean number of previous pregnancies (SD)	3.45 (2.0)	4.09 (1.8)	3.84 (1.9)
Mean gestational age in days (SD)	42.6 (9.4)	41.2 (7.3)	41.8 (8.2)
Procedures managed at FOPs	145 (66%)	222 (67%)	367 (66%)
Procedures managed at referral centers	75 (34%)	112 (33%)	187 (34%)

Table 2

Consultations with supervisor, unscheduled patient visits following mifepristone, referrals

Characteristic	Alamudun	Suzak	Total
Midwife consultations with supervisor (%)	13 (5.9%)	11 (3.3%)	24 (4.3%)
Unscheduled visits (%)	8 (3.6%)	11 (3.3%)	19 (3.4%)
Referrals following unscheduled visit (%)	5 (62.5%)	9 (81.8%)	14 (73.7%)
Consultations at the time of follow-up (%)	5 (2.3%)	2 (0.4%)	7 (1.3%)
Referrals at follow-up visit (%)	5 (2.3%)	0	5 (0.9%)

#### 3.3. Case management

The majority of women (62%) took mifepristone in the clinic and misoprostol at home; many women reported that it was more private and comfortable to have the abortion at home. Midwives consulted their gynecologist supervisors in less than 5% of cases at three stages of the process — before mifepristone (6 cases or 1.1%), between mifepristone and misoprostol (6 cases or 1.1%), and after misoprostol (12 cases or 2.2%) (See Table 2).

Only 3% of participants made an unscheduled visit to their midwife following use of mifepristone and misoprostol. The most common reason for an unscheduled visit was perceived excessive bleeding (11 cases). Other reasons included the following: more pain than expected (5 cases); less bleeding than expected, vaginal discharge, nausea/vomiting, chills/shivering (2 cases each); and fever more than 38C (1 case). Midwives/nurses sent 14 of the 19 women making unscheduled visits to a referral center for further follow-up.

At the follow-up visit, seven cases led to telephone consultation with the supervisors. Five of these consultations reflected concerns midwives/nurses had about whether the abortions were complete, and the women were referred for further care. Two cases were resolved without referral.

#### 3.4. Postabortion contraception

All but 3 of the 554 women chose a contraceptive method following their abortion — 304 (54.9%) chose pills, 148 (26.7%) condoms, 86 (15.5%) IUD, 12 (2.2%) Depo-Provera® and 1 (0.2%) withdrawal.

#### 3.5. Women's acceptability of medical abortion services

Approximately 61% of the women (337/554) receiving services completed the voluntary, self-administered acceptability form at the follow-up visit. Nearly all of them agreed that the medical abortion procedure had been clearly explained (99.7%; 336/337 respondents), that the service was convenient (99.4%; 334/336 respondents) and that they would recommend the service to a friend (99.1%; 331/334 respondents). Most women also agreed that they received sufficient information from the midwife to decide which contraceptive to use (97.3%; 326/335 respondents).

#### 4. Discussion

This study provides important evidence of the feasibility of expanding medical abortion care to underserved women in Kyrgyzstan by training midlevel healthcare providers. Women receiving Medabon® from midwives or family nurses had a high level of complete abortion and reported satisfaction with all aspects of the services provided. There were no adverse events or safety issues documented during the course of the intervention. The study also demonstrated successful home-based use of misoprostol, and a successful and practical model for supervision and referrals.

The results are bolstered by the successful follow-up of all 554 women receiving Medabon®. Reasons for the excellent follow-up may include one or more of the following aspects. First, the midwives and family nurses are an integral part of the communities where they work and are known to most of their clients and patients, whose care they trusted. Secondly, the study provided funds for paid mobile phone calls, thus facilitating communication between the women and the midwives/nurses, which both women and midwives/nurses made good use of. These two aspects point to the value of providing this service at community level.

Looking to the future, the scaling up and sustainability of midwives and nurses providing medical abortion will depend on a number of factors. Although all services were provided free of charge during the study, a fact which probably affected women's and service providers' overall satisfaction, free services may not be sustainable under the current financial conditions in the country. Maintaining stocks of Medabon®, contraceptives, pregnancy tests and related supplies were also extended well beyond the norms of practice typically found in Kyrgyzstan. The impact on women's and healthcare providers' attitudes and perceptions if stocks cannot be sustained should not be underestimated.

Despite these caveats, the excellent results from the study support scaling up the training of midwives and nurses in Kyrgyzstan to provide medical abortion in underserved areas as a strategy for improving women's access to contraception and safe abortion care. Success in doing so will require strengthening the health system infrastructure and taking a number of other important steps. Medabon® or a similar high-quality mifepristone–misoprostol combi-pack must be registered and made available at an affordable public-sector price. New, permanent regulations must be established which authorize the provision of medical abortion by trained midwives and nurses. The procurement and distribution system for reproductive health technologies, including medical abortion drugs and contraceptives, must be strengthened to ensure that services will not be subject to commodity stockouts. Medical abortion must be added to preservice medical education, continuing education programs and in-service training for midwives and nurses. Lastly, midlevel healthcare providers must be incorporated into the district-level coordination, supervision, monitoring and reporting of abortion services in order to ensure their ongoing enthusiasm for service provision and quality improvement.

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#### References

- [1] Sjöström S, Kopp Kallner H, Simeonova E, Madestam A, Gemzell-Danielsson K. Medical abortion provided by nurse-midwives or physicians in a high resource setting: a cost-effectiveness analysis. *PLoS One* 2016;11(6):e0158645.
- [2] Kopp Kallner H, Gomperts R, Salomonsson E, Johansson M, Marions L, Gemzell-Danielsson K. The efficacy, safety, and acceptability of medical termination of pregnancy provided by standard care by doctors or by nurse-midwives: a randomised controlled equivalence trial. *BJOG* 2015;122:510–7.
- [3] Ngo TD, Park MH, Free C. Safety and effectiveness of termination services performed by doctors versus midlevel providers: a systematic review and analysis. *Womens Health* 2013;5:9–17.
- [4] Renner RM, Brahmi D, Kapp N. Who can provide effective and safe termination of pregnancy care? A systematic review. *BJOG* 2013;120:23–31.
- [5] Warriner IK, Wang D, Huong NT, Thapa K, Tamang A, Shah I, et al. Can midlevel health-care providers administer early medical abortion as safely and effectively as doctors? A randomised controlled equivalence trial in Nepal. *Lancet* 2011;377:1155–61.
- [6] Yarnall J, Swica Y, Winikoff B. Non-physician clinicians can safely provide first trimester medical abortion. *Reprod Health Matters* 2009;17(33):61–9.
- [7] World Health Organization. Health worker roles in providing safe abortion care and post-abortion contraception. Geneva: World Health Organization; 2015.

- [8] World Health Organization. The WHO strategic approach to strengthening sexual and reproductive health policies and programmes. Geneva: World Health Organization; 2007.
- [9] United Nations Department of Economic and Social Affairs Population Division. Population databases. <http://www.un.org/en/development/desa/population/publications/database/index.shtml>.
- [10] United Nations Development Programme. Human development report 2015. [http://hdr.undp.org/sites/default/files/2015\\_human\\_development\\_report.pdf](http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf).
- [11] World Health Organization. Trends in maternal mortality: 1990 to 2015: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations population division. Geneva: World Health Organization; 2015.
- [12] Global abortion policies database. Country profile: Kyrgyzstan. <http://srhr.org/abortion-policies/country/kyrgyzstan/>.
- [13] World Health Organization. Safe abortion: technical and policy guidance for health systems. 2<sup>nd</sup> ed. Geneva: World Health Organization; 2012.
- [14] de Tolly KM, Constant D. Integrating mobile phones into medical abortion provision: intervention development, use, and lessons learned from a randomized controlled trial. *JMIR Mhealth Uhealth* 2014;2(1)e5.
- [15] Bracken H, Lohr PA, Taylor J, Morroni C, Winikoff B. The acceptability and feasibility of remote technologies for follow-up after early medical abortion. *Contraception* 2014;90(1):29–35.
- [16] Sääv I, Fiala C, Hämäläinen JM, Heikinheimo O, Gemzell-Danielsson K. Medical abortion in lactating women — low levels of mifepristone in breast milk. *Acta Obstet Gynecol Scand* 2010 May;89(5):618–22.