Review

High-tech family planning: reproductive regulation through computerized fertility monitoring

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ABSTRACT

Issues related to family planning have profound public health significance as they directly impact individuals, couples, and families throughout the world. A new method of family planning is now available using a computerized fertility monitor that accurately measures urinary surges in estrone-3-glucuronide (E3G) and luteinizing hormone (LH) prior to ovulation, thus identifying the short-lived fertile phase of the cycle and providing women with the choice to achieve or avoid conception. As well as ease of use and instruction, hand-held computerized fertility monitors are accurate and effective and can be used indefinitely. An algorithm for computerized monitoring is presented for use in situations of infrequent or irregular ovulation such as with polycystic ovarian syndrome and the post-partum period. Hormone-based fertility monitoring is compared to other computerized fertility monitoring techniques. A case series of seven reports reflecting varied clinical backgrounds and medical histories demonstrates broad-based success and high satisfaction with computerized monitoring for regulation of reproductive potential. Limitations of fertility monitoring are also discussed.

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1. Introduction

The term ‘family planning’ generally refers to the broad concept of using specific strategies or interventions with the objective of establishing and maintaining reproductive regulation with the choice to determine when and how often to have children. As most heterosexual couples wish to reproduce at desired intervals, family planning is a fundamental issue that faces most people throughout the world at some stage in their lives and is of utmost significance to maternal and public health. Despite the array of contemporary options, some individuals are unable or choose not to employ currently available contraceptive methods. Recent advances in technology and molecular testing have ushered in a new category of family planning interventions called computerized fertility monitors which provide a novel approach to achieving and maintaining control over reproductive choices.

Although myriad family planning options have been available, a proportion of couples have failed to find a method that best suits their needs and desires. The 2002 Canadian Contraception Study [1] describes the spectrum of contraceptive methods used by a sample of Canadians (N=1582) including oral contraceptives (32%), condoms (21%), male sterilization (15%), female sterilization (8%) and withdrawal (6%). 9% of respondents did not use any method of contraception. Among respondents however, 26% were not completely satisfied with the combination of the OC and the condom [1]. Given the reservations expressed by some women about current contraceptive options, information about novel approaches to effective family planning might be welcome.

In 1979, Collins et al. [2] measured oestrone 3-glucuronide, LH and pregnanediol-3-alpha-glucuronide in urine, and proposed that these biochemical indicators could be used to delineate the fertile phase and to predict ovulation. Using a process referred to as ‘Ovarian Monitoring,’ Blackwell and Brown subsequently developed a method to assess ovarian activity by measuring urinary hormones [3,4]. In response to increased research in the area of fertility monitoring, Carl Djerassi – the chemist who discovered the synthetic progestin used in the first OC – suggested in a 1990 issue of Science that family planning through home-based biochemical measurement of hormones made “political and ethical sense” [5]. He predicted that in years to come, modern women may feel entitled to know when they are ovulating and that family planning services through hormone monitoring would expand, particularly for couples unable to use “artificial” methods. Consistent with his forecast, computerized monitoring of hormonal status now provides reproductive-age women with the opportunity to exert enhanced control over their fertility by identifying the onset of the fertile period and the timing of ovulation.

2. Methods

In this paper, a review of hand-held computer fertility monitors is presented along with instructions for use, available data on success rates, and algorithms for use in general as well as in special circumstances. Seven case scenarios of women with differing medical and social circumstances using fertility monitors are also presented to emphasize the potential clinical outcomes of incorporating this approach to family planning in selected patients. Computerized fertility monitoring is also compared to other hormone-based fertility monitoring techniques.

This review was prepared by assessing available medical and scientific literature from Medline, as well as by reviewing several books and conference proceedings. Searching techniques included key word searches with terms related to fertility monitors and family planning. A primary observation, however, was that limited scientific literature is available on this issue. Available publications were reviewed and incorporation of data was confined to information deemed to be of clinical significance. After research and clinical data were compiled, information relevant for clinical practice was prepared in discussion format as well as in table form and is presented in this manuscript. The format of a traditional integrated review was chosen as such reviews play a pivotal role in scientific research and professional practice in medical issues with limited primary study and uncharted clinical territory [6].

3. Computerized fertility monitors

The use of biochemical assessment of hormonal levels to predict ovulation stemmed from a series of research studies by a World Health Organization (WHO) Task Force in the late 1970’s that evaluated the relationship between various endogenous hormones and ovulation [7]. Fertility monitoring is based on understanding and recognition of inherent reproductive physiology whereby the ovum in reproductive-age women is released once per cycle and is typically fertilizable for 18–24 h [8]. Sperm are typically capable of fertilizing for up to 5 days [8]. (With elapsing time after 3 days, there is decreasing probability that sperm remain potent, with rare findings of potency at 7 days [8].) Studies demonstrate that conception generally occurs within a 6-day window ending with 24 h of ovulation [9]. Ninety-four percent of pregnancies, however, are associated with sperm that were less than 3 days old [9]. The probability of conception ranges from only 10% when intercourse occurs 5 days prior to ovulation [9], up to about 33% when coitus occurs on the day of ovulation [8,9].

Biochemical identification of the fertile period and avoidance of unprotected intercourse during this fertile phase may allow couples to prevent pregnancy. In the initial WHO studies, it was determined that measurable changes in serum estradiol reflect the onset of potential fertility, and that a luteinizing hormone (LH) surge is the best predictor of impending ovulation [7]. To obviate the need for a serum sample, it was subsequently found that the rise of urinary estrone-3-glucuronide (E3G) correlates well with elevations in serum estradiol and the onset of potential fertility [10], while impending ovulation can be predicted by a surge in urinary LH. A more recent comparison between hormonal, ultrasound and symptom-based prediction of ovulation confirms this concordance between hormonal and ultrasound measures of ovulation [11].

Hormone-based family planning using fertility monitors generally relies on the measurement of urinary E3G and LH to consistently delineate the fertile period [12]. The Persona® and the Clearblue® series of fertility monitors employ a urine-based test strip with antibodies to E3G and LH in order to detect and monitor elevations in the concentrations of these hormonal metabolites. The Persona® monitor (Swiss Precision Diagnostics), primarily available in Europe, was marketed for the purpose of contraception and the current model has a predicted correct-use effectiveness of 94% [13]. After establishing a correct-use effectiveness of 88% in a study with the original methodology, a revised algorithm for sensitivity within the monitor was established in order to achieve a correct-use effectiveness of 94%. A lower E3G threshold is used in the currently distributed Persona® monitor [13]. This monitor is generally available and acquired in North America through the Internet, although it is not yet approved for family planning purposes by the US Food and Drug administration.

The second computerized fertility monitoring device was marketed for the purpose of achieving pregnancy and is distributed as Clearplan Easy® and Clearblue Easy® in Europe and North America (Swiss Precision Diagnostics) and as Clearview Primera® in Japan (Mitsui Pharmaceuticals Inc., Japan). Since the Clearblue Easy® fertility monitor (CEFM) was designed as a tool to achieve pregnancy, its use to avoid pregnancy in North America remains...
off-label." Persona® displays a green light during the infertile time and a red light during the fertile time, with the appearance of an egg symbol when the LH surge is detected. The CEFM, on the other hand, displays a 'Low,' 'High,' or 'Peak' fertility reading, where 'High' refers to the rise in urinary E3G and 'Peak' refers to the urinary LH surge.

Studies on urinary measurements for these monitors have been found to consistently predict fertility periods: for example, ovulation occurred 97% of the time during one of the two peak days or the subsequent high day on the CEFM, as confirmed by transvaginal ultrasound [14] and more importantly, no ultrasound-detected ovulations occurred before the display of peak days on the monitor [14]. A Japanese study also showed good agreement between the monitor readings and laboratory measurements of hormones with this fertility monitor [15]. Sensitivity and specificity for both the CEFM and Persona® are provided in Table 1.

It should be noted that Persona® has a lower threshold for E3G detection and therefore a slightly longer window of fertility readings prior to ovulation as compared to the fertile phase indicated by the CEFM. However, given that the CEFM is more readily available in North America, it has been more widely adopted than Persona® for family planning in Canada and the United States. The instructions for general use of fertility monitors are provided in Fig. 1. At present, the algorithm shown in Fig. 1 for the CEFM is based on clinical experience, not on randomized controlled trials, and therefore exact effectiveness rates of the proposed approach are not yet known.

The CEFM has also been studied in conjunction with cervical mucus observations as a method of family planning referred to as the 'Marquette Method', in which data from the CEFM are combined with observation of cervical mucus changes during the fertile phase [16]. The benefit of the Marquette Method is that the observation of cervical mucus changes (reflecting changes in estrogen levels) serves as a 'double check' method of the data from the CEFM computerized monitor [17]. In a recent retrospective cohort comparison, the Marquette Method was shown to be more effective (with a correct-use pregnancy rate of 2% and a typical-use pregnancy rate of 12% [18]) than cervical mucus observation alone for family planning. The Marquette Method may incorporate an online charting program (at nfp.marquette.edu) that allows interested users to integrate the CEFM hormonal levels with cervical mucus changes.

3.1. Fertility monitoring based on other physiological indices

Other fertility monitors are available which employ various signs within the body to determine hormonal changes and to predict ovulation. Valley Electronics Ltd. (Germany) and Natural Methods Inc. (United States) distribute three similar devices (LadyComp®, BabyComp®, and Pearly®) that incorporate data regarding menstrual patterns in the woman as well as waking basal body temperature to determine whether a woman is likely fertile or not. One retrospective trial of 648 women using these types of monitors demonstrated

Table 1

<table>
<thead>
<tr>
<th>Accuracy of onset of fertility</th>
<th>Sensitivity</th>
<th>Specificity</th>
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<tr>
<td>Persona®: 95.8% [47]</td>
<td>CEFM: 100% [14]</td>
<td>Persona®: not yet available [47]</td>
</tr>
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</table>

* Based on correlation of ovulation findings on ultrasound examination.

Fig. 1. General Instructions for use of 'ClearBlue Easy®' and 'Persona®' fertility monitors in women with regular menses.

Instructions for use of ClearBlue Easy® Fertility Monitor:
1. Press the ‘M’ button at the onset of menstruation.
2. Perform testing daily by applying some first morning urine to the test stick and inserting the stick into the monitor. Testing should be performed from Day 6 until the last ‘High’ reading on the monitor (usually 10-15 days per month).
3. To prevent pregnancy, avoid unprotected intercourse when ‘High’ or ‘Peak’ fertility readings are displayed.

Instructions for use of Persona® Fertility Monitor:
1. The ‘M’ button is pressed at onset of menstruation.
2. Daily testing is performed by wetting a test stick with first morning urine and inserting the test stick into the monitor starting on Day 6 and each of the following days as indicated by the monitor. Testing is done for 16 days in the first cycle, and for 8 days in each subsequent cycle.
3. To prevent pregnancy, unprotected intercourse is avoided when a red light is displayed on the monitor.

an overall practical Pearl Index of 3.8 [19]. (3.8 unintended pregnancies per 100 women per year.) With proper use, the corrected Pearl Index was estimated at 0.7 in this report [19]. In addition to the above monitors developed to preclude pregnancy, other fertility monitors are marketed for the designated purpose of achieving pregnancy – devices which are also sometimes used for fertility regulation. OvaCue® (Zetek Inc., USA), for example, measures electrolytes in the saliva (a sensor is placed on the tongue for 5 s each morning to anticipate when ovulation will occur). Based on generated findings of the monitor in previous cycles, this device is designed to predict the LH surge 5–6 days in advance [20].

Fehring has comparatively evaluated the use of various fertility monitors including the salivary and vaginal electrolyte monitor CUE® Ovulation Predictor [21], the vaginal electrolyte monitor Ovulon® [22], and a crystalline ferning microscope detector Lady Free Biostester® [23]. CUE® Ovulation Predictor involved use of a vaginal probe but this method was not pursued as it was determined to be somewhat invasive [21]. The Ovulon® monitor also involved use of a vaginal probe and had only a modest correlation between the predictive ovulatory peak and the actual LH surge [22]. The salivary crystalline method presented a challenge in pinpointing the beginning and end of ovulation as it was limited by the subjective nature of observing changes via a microscope [23]. Guida et al. [24], assessed ovulation determination measured by transvaginal ultrasound as compared to urinary LH measurement (using the CEFM), salivary beta-glucuronidase, salivary ferning, cervical mucus changes and basal body temperature. Of particular note is the fact that he found that urinary LH measurements with the CEFM were the single most accurate and precise method to delineate the timing of ovulation [24].

4. Case reports

Family planning using computerized monitors may be suitable for couples with assorted needs and intentions. Patients with contra-indications to hormonal contraception, those experiencing
adverse effects to other contraceptive methods, those wishing to practice ‘green’ family planning by avoiding hormonal contamination of the environment, and individuals inimical to artificial contraception for religious or philosophical reasons may all be potential candidates for fertility monitoring. In order to illustrate the applicability of computer monitoring in clinical practice settings, a series of seven brief case histories from the clinical practice of the first author are presented for consideration.

4.1. Case history #1

A 26-year-old woman previously developed a deep vein thrombosis (DVT) and pulmonary embolus in the post-partum period following her first pregnancy. She was assessed by an internist and subsequently saw a hematologist for discussion of subsequent prophylaxis and preventive measures to avoid recurrence of thrombotic complications. She was advised never to take the oral contraceptive pill or any form of hormonal contraception. The patient was subsequently counseled by an obstetrician in use of a CEFM computerized fertility monitor and successfully used the device to avoid pregnancy for the subsequent 28 months until another pregnancy was planned.

4.2. Case history #2

A 23-year-old woman presenting for family planning advice mentioned on past medical history that she had experienced a stroke after commencing oral contraceptives at age 19. The patient recovered from the cerebrovascular event with no residual health sequelae but was counseled never to use hormonal contraception. She was instructed in use of a CEFM computerized fertility monitor and successfully avoided pregnancy for the following 3 years as desired.

4.3. Case history #3

A 39-year-old Catholic woman with seven children presented for family planning advice. As well as suffering from a serious mood disorder, the patient was experiencing financial difficulty as her husband was recently disabled following a work-related injury. The patient reported that she had been unsuccessful at avoiding pregnancy using cervical mucus self-testing in the last three pregnancies but adamantly refused to use artificial contraception for religious reasons. She was delighted to learn about the CEFM device for the next 5 years without incident. After using the fertility monitor for a number of years the patient commented, “the stress it has taken out of our marriage is incredible.”

4.4. Case history #4

A 28-year-old environmental activist presented for advice regarding options for family planning. The patient emphatically indicated that she did not wish to pollute the environment by consuming and then excreting hormones into the water supply. She presented evidence of damage to wildlife and aquatic systems as a consequence of estrogens originating from hormonal contraception contaminating water systems. Various options were explained and the patient chose to use a computerized fertility monitor. The patient has successfully used the monitor for 3 years.

4.5. Case history #5

A 24-year-old university student with no history of mood related problems became excessively anxious and depressed after starting the OC 6 months prior to her wedding date. She was told the mood problems were likely related to the stress of getting married, and an antidepressant was added. Her mood disorder persisted and she complained of absent libido 6 months into marriage. In addition, she was referred for a gynecological opinion relating to recurring yeast infections. When her oral contraceptive was discontinued on recommendation of the consultant, the yeast infections cleared, her depression lifted, antidepressant medication was stopped, and she re-established normal libido. The patient successfully used the fertility monitor for a 3-year period as desired.

4.6. Case history #6

A woman in her 20s with a past history of non-Hodgkin’s lymphoma presented for advice regarding family planning options. She wished to avoid hormonal contraception and was intrigued by the CEFM. She successfully used the device for 3 years at which time she chose to conceive a pregnancy.

4.7. Case history #7

A 26-year-old woman successfully used the CEFM monitor to avoid pregnancy for 1-year post-partum. In the 13th post-partum month, however, she conceived unintentionally as the CEFM did not identify the fertile window early enough. On retrospective assessment of the monitor pattern, it appeared that she had only one ‘High’ reading before a ‘Peak’ day indicating a very brief fertile period prior to ovulation (a pattern that may occur regularly or intermittently with some patients – as subsequently discussed in this paper.). It appeared likely that she conceived on the ‘Low’ day immediately preceding the first ‘High’ day. With regards to future family planning, it was discussed that use of the more sensitive Persona® monitor, or employing additional precautions by using the Marquette Method in association with the CEFM in the phase prior to ovulation, would likely identify brief pre-ovulatory occurrences in the future in order to regulate fertility.

5. Discussion

Hormone-based computerized fertility monitors are currently being used by women for family planning, both in isolation and in conjunction with other methods of fertility monitoring. The Persona® monitor has been found to have 94% correct-use effectiveness for avoiding pregnancy [13]. The Marquette Method, which combines CEFM hormone monitoring with mucus self-observation and an algorithm for adding days to the fertile window, has been shown to have a 98% correct-use effectiveness rate and an 88% typical-use effectiveness rate [18]. A CEFM monitor-only approach as described here, however, requires further prospective trials to determine practical evidence-based effectiveness. Preliminary reports from health providers recommending this approach in appropriate clinical situations, however, are encouraging – most women appear satisfied with the method, reliable fertility control is achieved if used consistently, and there appear to be no serious side effects associated with use of such monitors. Further research including randomized control trials on fertility monitoring is currently underway [25] and published outcomes of these studies will add to the sparse but accumulating body of evidence on this approach to family planning.

5.1. Limitations

Since no form of family planning is without failure, couples need to be adequately informed about limitations regardless of the method employed. Table 2 reviews the limitations associated with the use of fertility monitors. A potential adverse effect of this...
approach to family planning is that avoidance of unprotected intercourse is required during the fertile phase. Furthermore, like hormonal contraception, use of these monitors does not provide protection against STIs.

In a minority of cases, there may be a very brief fertile period ('High' days) prior to 'Peak' ovulation readings as determined and displayed by the monitor (as reported in Case #7). It has been reported that up to 13.5% of women will regularly have only 1 or 2 'High' days on the monitor prior to 'Peak' ovulation [26]. Without risk of conception, it is possible to identify women consistently having brief pre-ovulatory phases by avoiding unprotected intercourse (in the phase prior to ovulation) for the first couple of cycles of monitor usage in order to observe and detect the length of the fertile period. These women would benefit from either the longer pre-ovulatory window defined by the Persona™ monitor (which has a lower E3G threshold level and thus provides a longer pre-ovulatory fertile window than the CEFM), a double check method as provided by the Marquette method, or additional forms of protection during the pre-ovulatory period. It is not yet clear whether many women experience occasional or intermittent brief pre-ovulatory fertile phases – if so, this may result in a slightly lower correct-use effectiveness rate with the CEFM monitor alone approach. While science moves forward in the area of fertility monitoring, increasing research is required to fully address limitations.

5.2. Cost analysis

Fertility monitors typically range from $150 to $200 at local drugstores, but can be purchased new or used for as little as $50 via the internet. There is an ongoing expense of purchasing urine test-sticks which cost approximately $15/month (assuming 10 sticks are used). The expense would be greater while breast-feeding or in the case of infrequent ovulation because more test-sticks would be needed. In comparison to the average cost of oral contraceptives ($15–$75/month depending on coverage), a fertility monitor may be similar in cost or less expensive in the long term.

5.3. Fertility monitor use in special circumstances

There are some specific situations where adjustment is required in use of the fertility monitoring device to account for uncertainty in the frequency of ovulation: (a) the post-partum and lactation period, and (b) the situation of infrequent ovulation with erratic menses, as may be found with conditions such as polycystic ovarian syndrome.

5.3.1. Post-partum and lactation period

Since the onset of ovulation is not predictable during the post-partum phase or while breast-feeding, and ovulation generally occurs before the onset of menses (i.e. a first menses is not soon enough to start using the monitor), use of the fertility monitor must be adapted slightly. A modification of an approach first described by Fehring et al. [27] is presented for consideration by patients who are breast-feeding but not menstruating (Fig. 2). The modification involves confirming a 'Low' reading on the CEFM on the other day if not active. To prevent pregnancy, unprotected intercourse is avoided on 'High' or 'Peak' days. The Persona™ monitor does not yet have the facility to be a reliable method of fertility planning in patients with infrequent menses.

5.3.2. Irregular or infrequent ovulation

As with post-partum or post-pill amenorrhea, patients with infrequent or irregular ovulation also require some modification in monitoring, since the monitor only manages cycles up to 42 days in length. For infrequent ovulation, a similar method to the one described for post-partum situations can be used (Fig. 2). In review, the CEFM monitor is repeatedly reset as required to trigger 20-day cycles, and the urine is tested every day if sexually active or every other day if not active. To prevent pregnancy, unprotected intercourse is avoided on 'High' or 'Peak' days. The Persona™ monitor does not yet have the facility to be a reliable method of fertility planning in patients with infrequent ovulation.

5.3.3. Monitor application unrelated to pregnancy avoidance

In addition, the fertility monitor may have other applications in a primary care setting. Since the monitor accurately detects hormone changes during the menstrual cycle, it could be used to assess whether ovulation is occurring following successful treatment of polycystic ovarian disease and to evaluate ovulation in women recovering from anorexia nervosa. Of course, it is also effective in helping couples time intercourse for the purpose of achieving a pregnancy [28].

A recent article in Pediatrics proposed the concept of identifying the menstrual cycle as a 'vital sign.' As such, the monitors discussed in this paper could be used to detail a woman's cycle including her fertile phase and the time of ovulation [29]. This information would allow primary care physicians to diagnose disordered menstrual cycles with more certainty and expediency than through history taking alone. Another proposed use for the CEFM is perimenstrual migraine prophylaxis – when the monitor anticipates the approach of menses with a flashing “M” symbol, a patient could potentially preclude the onset of a migraine headache by planning prophylaxis accordingly [30]. Aside from use in migraine prophylaxis, we were unable to find other reported case histories in the literature which confirm the use of fertility monitoring for prophylaxis against other health conditions.

5.4. Niche for fertility monitoring amidst popular methods of contraception

As numerous articles in the medical literature continue to recognize and support oral contraception as the main vehicle to achieve fertility control in healthy women wishing to maintain reproductive capacity, hormonal contraception will likely remain the most popular and most commonly recommended approach to

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birth control. Although the overwhelming majority of women in the western world have used oral contraception and express ongoing satisfaction with this method, recent evidence confirms that some individuals remain reluctant to use hormonal contraceptives [1] and some have medical contra-indications to hormonal birth control [31].

Furthermore, amidst a global milieu of diversity in lifestyle and perspective, enhanced concern about environmental contamination [32], and increased awareness about potential sequelae from endocrine disruption resulting from hormonally active compounds, some couples are keen to be apprised of the range of family planning options with accordant risks and benefits. Along with the established benefits of hormonal contraception including enormous efficacy and simplicity of use, for example, a comprehensive review of the recent medical literature also suggests potential adverse sequelae including increased risk of thromboembolic disease [33], cancer [34–36], adverse individual well-being [37], cardiovascular disease [38], enhanced risk of STI transmission [39], bone health compromise [40], potentially irreversible sexual dysfunction [41], congenital health problems [42,43] obstetric complications [44] and environmental contamination [45]. As a result, some informed couples are seeking alternative solutions for their family planning needs. Many users of hormonal contraception, however, have not been apprised of the documented risks described in the literature.

Other methods of family planning such as intrauterine devises, barrier methods and natural methods are less popular than hormonal birth control in the general population [1]. Sterilization procedures will likely remain popular only among couples wishing to terminate their fertility potential. Fertility monitoring will perhaps develop a niche with couples wishing to maintain reproductive capacity, those uncomfortable with other forms of birth control, and those willing to commit to the inconvenience of testing on a regular basis.

6. Conclusion

For women unable or unwilling to use other methods of fertility regulation, recognition of fertility status via a home-based biochemical test may be a welcomed addition to current family planning options. Fertility monitoring provides selective individuals with a user-friendly family planning method without adverse effects to themselves or the environment. Given their ease of use (Figs. 1 and 2), health professionals will find instruction regarding fertility monitors to be straightforward and not time-consuming. The modest expense would likely be manageable for most women and the fertility monitor could be added to government formularies as a cost-effective option for family planning. Although limitations of a monitor-only approach are evident (Table 2), use of fertility monitoring is emerging as a promising option for some women who are looking for a safe and effective method of family planning.

Conflict of interest

There are no conflicting interests.

Funding

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References


Table 2

<table>
<thead>
<tr>
<th>Limitations of computerized fertility monitor use for family planning.</th>
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<tbody>
<tr>
<td>1. Requirement for regular testing may be a deterrent for some individuals.</td>
</tr>
<tr>
<td>2. Additional instruction with modification is required for reliable use in women with inconsistent ovulation – e.g. post-partum or polycystic ovarian syndrome (provided in Fig 2)</td>
</tr>
<tr>
<td>3. No protection against STIs</td>
</tr>
<tr>
<td>4. Avoidance of unprotected intercourse is required during fertile days to prevent pregnancy</td>
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<tr>
<td>5. A minority of patients have a short fertility phase reading on the CEFM monitor prior to ovulation. Added precaution or use of Persona® or Marquette method may be necessary</td>
</tr>
<tr>
<td>6. Cost of test-sticks is ongoing ($15/month) – not yet covered by government formularies</td>
</tr>
<tr>
<td>7. Persona® monitor not useful for fertility monitoring in post-partum phase or with patients experiencing irregular ovulation</td>
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