ELSEVIER

Contraception 75 (2007) 185–192

Contraception

Original research article

Identifying appropriate IUD candidates in areas with high prevalence of sexually transmitted infections☆

Charles S. Morrison*, Lisa Murphy, Cynthia Kwok, Debra H. Weiner

Clinical Research and Biostatistics Divisions, Family Health International, P.O. Box 13950, Research Triangle Park, NC 27709, USA

Received 14 September 2006; revised 22 October 2006; accepted 23 October 2006

Abstract

Background: The IUD is a highly effective, safe, inexpensive and long-lasting contraceptive. However, IUDs may increase PID risk during the early postinsertion period when inserted in women with cervical infections. We developed a simple algorithm to identify women at low risk of current sexually transmitted infection (STI) who are appropriate IUD candidates in regions with moderate or high STI prevalence.

Methods: We used data sets from family planning populations in Kenya, Zimbabwe, Jamaica and the United States to develop optimum algorithms. We then validated these algorithms using data sets from family planning populations in Thailand and Uganda.

Results: A simple unweighted algorithm based on age, living with partner, education, bleeding between periods and a behavioral risk score (number of sex partners, condom use) was the most useful. Adding clinical signs did not improve algorithm performance. Women categorized at low risk by this algorithm were at substantially reduced risks of cervical infection. Women identified at high STI risk had at least twice the risk as the overall clinic populations. Women in the moderate-risk group had STI risks similar to the overall clinic populations.

Conclusion: Women categorized as low risk by the algorithm can be referred for IUD insertion while women categorized at high risk should not receive an IUD without further testing or treatment. Women in the moderate-risk group should be triaged based on the STI prevalence of the overall clinic population. A simple checklist has been developed to help providers estimate a client's risk of current STI and to guide appropriate triage.

Keywords: Intrauterine devices; Sexually transmitted infections; Contraception; Screening; Women; Africa; *Chlamydia*; Gonorrhea

1. Introduction

For most women, the IUD is a highly effective, safe, inexpensive and long-lasting contraceptive method. However, IUDs appear to increase the risk of PID during the early postinsertion period when inserted in women with cervical chlamydial and gonococcal infections [1,2]. Because of this and the lack of an accurate, fast and inexpensive laboratory test for diagnosing these cervical infections, use of the IUD is generally low in resource-poor settings with moderate to high prevalence of sexually transmitted infections (STIs) [3,4].

Based on a study we conducted in Kenya to evaluate the safety of IUD use in HIV-infected women, we developed several algorithms using data collected through interviews that could be used to identify appropriate candidates for IUD insertion when STI testing cannot be routinely performed [5]. The primary objective of the current analysis is to determine if one or more simple algorithms can be developed to identify appropriate IUD candidates by assessing current STI risk among those women seeking family planning in regions with moderate or high STI prevalence where laboratory testing cannot be routinely conducted. A secondary objective is to determine if these algorithms can identify women at high risk of current cervical infections so that they may receive appropriate

☆ This project has been funded through a cooperative agreement between the US Agency for International Development (USAID) and the Family Health International (FHI) (CCP-A-00-95-00022-02). The content of this publication does not necessarily reflect the views or policies of the USAID or FHI.

* Corresponding author. Tel.: +1 919 544 7040; fax: +1 919 544 7261.
E-mail address: cmorrison@fhi.org (C.S. Morrison).

0010-7824/$ – see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.contraception.2006.10.004

contraceptive and STI/HIV risk-reduction counseling as well as diagnostic and management services.

We used a two-phase process to develop and evaluate such algorithms. In a "development phase" we used data sets from family planning clinics in Kenya, Zimbabwe, Jamaica and the United States to develop the best general algorithms for identifying women at low risk of current cervical infections. Because such a process necessarily maximizes the algorithm's predictive potential for the data from which it was derived, it is important to confirm the algorithms against independent data sets. Therefore, in a "validation phase" we applied these algorithms to data sets from family planning clinic populations in Uganda and Thailand to validate their predictive ability.

2. Materials and methods

2.1. Development phase

We identified four data sets from a range of settings with moderate to high STI prevalence in the United States, Kenya, Jamaica and Zimbabwe [5–8]. The data sets included variables measuring sociodemographics, reproductive history, sexual behavior and STI history, and current STI symptoms and signs. It also contained laboratory confirmation of chlamydial and gonococcal infections. The US data set was from a study of hormonal contraception, cervical ectopy and cervical infections conducted in two reproductive health centers in Baltimore, MD [6]. The Kenya data set was from a study conducted among two family planning clinic populations in Nairobi [5]. The Jamaican data set came from a study of STIs among women attending family planning clinics in Kingston [7] while the Zimbabwe data set was drawn from a study of hormonal contraception and HIV acquisition being conducted in four family planning clinics in Harare and Chitungwiza, Zimbabwe [8]. Total sample sizes ranged from 615 (Kenya) to nearly 1400 women (Zimbabwe).

Based on review of data collection forms and response options, we defined common variables and response categories for initial bivariate tests of association with cervical infection. Those variables associated with cervical infection across a majority of data sets were then selected for multivariate analyses.

Multivariate modeling was conducted first using only "historical" variables — variables that could be obtained from client interview, such as social, demographic, reproductive/STD history, and behavioral items. Backward stepwise logistic regression was used to determine which variables were associated with the odds of cervical infection (at $p < .10$). Following variable selection, a model was developed weighting each variable equally. We also experimented with variable weighting schemes, but because these algorithms were not as useful and were more complicated than unweighted algorithms, they are not considered further in this report. [The results are available in a full report: "Identifying Appropriate Candidates for IUD Insertion in Moderate to High STI Settings: The IUD Algorithm Project" (Morrison, unpublished data).] Further, for the algorithms presented in the present article we initially developed and evaluated two-level forms — dividing women into low- vs. high-risk categories — based on various cut-points.

However, because ordinal or multicategory algorithms appeared to provide more complete and clinically useful information, we do not include the two-level algorithms in this report. Thus, we developed ordinal algorithms (e.g., comparing groups scoring 0, 1, 2, 3, 4 or 5) and then simplified the algorithms by collapsing the groups into three categories — low, moderate or high risk. We evaluated the algorithms by comparing post- vs. pretest infection probabilities (i.e., prevalence); that is, we determined whether applying the algorithm resulted in the women identified as low risk actually having a lower prevalence of infection and women identified as high risk actually having a higher prevalence of infection than the sample as a whole.

Next, data from clinical examinations were incorporated. We excluded women with clear contraindications to IUD insertion (cervical mucopus, cervical or vaginal ulcer, or clinical diagnosis of PID) since in actual clinical practice these women would be excluded once these signs were observed. We considered the following signs: abnormal vaginal discharge, high vaginal pH, inguinal adenopathy, abnormal cervical discharge (except mucopus), cervical ectopy, friable cervix, cervical erythema, cervical edema and strawberry cervix. Candidate clinical signs variables were evaluated and those that were related to cervical infection were then added to the "historical-only" models. Using the same methods described above, we developed the best "historical plus clinical signs" algorithms and determined appropriate categories.

Lastly, out of concern that the use of lower education in the historical-only model may be seen as stigmatizing women, we conducted a sensitivity analysis in which this variable was removed from the historical-only model.

2.2. Performance criteria

Because our primary objective was to identify the maximum number of women with low probability of cervical infection, the performance criteria most important in selecting an algorithm were (1) the likelihood ratio (LR) (the change in odds favoring disease given a particular algorithm score) [9] associated with the low-risk group and (2) the corresponding number of women identified as low risk for infection. Thus, the ideal algorithm would have a low LR associated with the low-risk group category (in the range of 0.66–0.75 or lower) with at least 50% of the women categorized this group. For our secondary objective (identifying women at high risk of infection), the ideal algorithm would have a high LR (>2.0) associated with the high-risk group and would thus identify a small proportion