HAS THE USE OF PAP SMEARS REDUCED THE RISK OF INVASIVE CERVICAL CANCER IN GUADALAJARA, MEXICO?

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Cervical cancer is a major public health problem in most of Latin America, where the highest incidence rates in the world have been reported (Restrepo et al., 1987). According to estimates from the International Agency for Research on Cancer, the incidence rate of invasive cervical cancer (ICC) in Mexico is one of the highest in the world, with an estimated annual age-adjusted rate of 40.1/100,000 in 1985 (Parkin et al., 1993). The Pan-American Health Organization classified 20 countries in the region, according to mortality rates of cervical cancer in the 35- to 64-year age group. The countries with the highest rates were Jamaica, Mexico, Chile and Nicaragua (PAHO, 1994). Between 1980 and 1990 the mortality rate for this disease in Mexico increased in some age groups. The mortality rate for women over 15 years of age during 1990 was 16.1/100,000 (Lazcano-Ponce et al., 1996). The mortality rate in the state of Jalisco among women 25 years and older rose from 22.7/100,000 in 1973 to 26.0/100,000 in 1992 (SSJ, 1996).

In Mexico, cytologic screening for cervical cancer was introduced as a national program 24 years ago, the mortality rate for this disease has been increasing. A case-control study was undertaken. Cases were women younger than 70, with newly diagnosed invasive cervical cancer (ICC), who had been residing for at least the past year in the metropolitan area of Guadalajara. They were selected from 5 hospitals belonging to the Mexican National Health System. Controls were women without cervical cancer who were treated in the same health center as the corresponding case. Analysis included 143 cases and 311 controls. Information on risk factors for cervical cancer and prior cervical cytologic screening was obtained through a standardized personal interview. Overall, 54% of the cases reported having had a cervical cytology test within the last 5 years, compared with 82% of controls. When compared with unscreened women, those who had ever had a Pap smear had a significantly lower risk of cervical cancer (OR = 0.3, 95% CI 0.2-0.4), and the protective effect persisted for over 5 years. Utilization of Pap smears in the metropolitan area of Guadalajara exerted a protective effect on ICC. Of the 65 women who reported a negative history of Pap smears, 45 would not have contracted cancer if they had ever had a Pap smear. Int. J. Cancer 82:804–809, 1999.

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MATERIAL AND METHODS

Two institutions of the Mexican National Health System, where the cervical cancer program is offered, were included in this study: the Mexican Institute of Social Security (IMSS), which provides health care to those formally employed and to their families, and the Secretariat of Health, which offers care to those groups not covered by any health-care scheme.

Cases were women diagnosed with ICC from August 1991 through March 1994, either histologically confirmed or diagnosed with clinical disease stage IB through IV, who were younger than 70 years of age, who had been residing for at least the past year in the metropolitan area of Guadalajara and who were referred for treatment or consultation to the hospitals included in the study. These included 3 hospitals of the IMSS, where all cervical cancer cases are referred: the Medical Center, General Regional Hospital Number 46 and General Hospital of Sector Number 89. The two hospitals with the most referrals of cervical cancer cases were selected from the Secretariat of Health: the Western General Hospital and the Civil Hospital of Guadalajara. Identification of subjects was through periodic review of the in-patient records of 3 services: oncology, gynecology and epidemiology. In addition, records from the pathology laboratory of each hospital were reviewed.

Controls were obtained from among women currently attending the health center (Primary Care Unit) in which the case was first seen or, if the case was initially evaluated at a hospital, the health center closest to the case’s area of residence. At the beginning of the study, as soon as we identified a case from the IMSS, we interviewed 2 controls from the same system. However, later in the study, we found that some of the subjects had not enrolled in the system until after diagnosis, and for those cases, we included controls from the Secretariat of Health. This procedure produced a

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ratio of 2.2 controls per case. Controls were age matched to cases within ±3 years, with similar restrictions on place of residence as the cases. They had to have an intact uterus and not be visiting the clinic for any reason related to cervical cancer screening or a gynecologic or obstetric condition.

The primary goal of the interview was to elicit a history of cervical cytologic screening. A calendar was used to record important events for each woman, such as age at marriage, pregnancies and age at menopause. Contraceptive history was also recorded on the calendar. The investigated Pap smears were the ones performed 12 months prior to the date on which the case was diagnosed or the corresponding date for the controls (reference date). We focused especially on the smears performed from 1 to 60 months prior to the reference date. Cytologies performed within 12 months of diagnosis or reference date were ignored. Subjects were questioned as to whether they had ever had a Pap smear, how many they had had, symptoms preceding each test, age at the first and last smear and any abnormal smear. Cytologic histories were not validated. In the metropolitan area of Guadalajara, a permanent record of such activities does not exist, and there is no central registry that keeps records in any of the institutions.

Information was also obtained about demographic factors, sexual behavior, pregnancy history, smoking, history of abnormal vaginal discharge, contraceptive use and some characteristics of the woman’s husband, such as education, history of venereal diseases and circumcision. In addition, data were collected about years living in current and previous residence, the use of health-care services, various health-behavior characteristics and knowledge of information about cytologic screening.

Interviews were conducted by specially trained women. Subjects were told only that it was a health survey. Since the identifying information for the cases was obtained from medical records after the women had been discharged, the interviews had to be conducted at the women’s homes. Interviews of women in the control group were conducted at the health center at the time they came for health-care services. Interviews lasted an average of 35 min.

We attained response rates of 94.1% in cases and 96.3% in controls. Three controls with no history of sexual intercourse were excluded from the analyses since virgins are presumably not at risk of cervical cancer and would only rarely receive a gynecologic examination. This left 143 cases and 311 controls for analysis.

Histologic information was recorded from reports from pathology laboratories. This information was available for 132 (92.3%) of the cases: 87.9% were squamous, 7.6% adenocarcinoma and 4.5% adeno-squamous carcinoma. FIGO (International Federation of Gynecology and Obstetrics) stage distribution was available for 131 (91.6%) of the cases: 26.7% were stage IA, 23.8% stage IB, 22.9% stage III and 2.5% stage IV. The 11 cases without histologic information were of clinical stages II and III.

The measure of association used was the RR, as approximated by the odds ratio (OR). Conditional and unconditional logistic regressions were used to obtain maximum likelihood estimates of the RR and the 95% confidence interval (CI) (Breslow and Day, 1980). The conditional logistic regression results were similar to the unmatched analysis presented here. Previously reported risk factors for ICC and variables associated with the disease in this study were explored as potential confounding factors when estimating the risk associated with screening practices. The variables considered are shown in Table I. However, only age adjusted estimates are presented for RRs in relation to various screening practices since estimates for these variables were not appreciably changed when any of the potential confounding factors were included in the regression models.

RESULTS

The average age was 49.5 years for cases and 49.1 years for controls. Cases and controls had very similar residence histories. Most of them had lived in Guadalajara for more than 10 years (93.6% of cases, 93.2% of controls). Approximately two-thirds of cases and controls were chosen from the IMSS (69.9% vs. 68.5%) and one-third from the Secretariat of Health. More cases than controls reported that they were divorced (11.2% vs. 7.4%) or single (17.5% vs. 13.2%). More cases than controls did some remunerative work at home (11.9% vs. 1.6%), and more were employed outside the home (26.6% vs. 23.8%).

As shown in Table I, risk factors for cervical cancer identified in this study are consistent with other reports. After adjustment for other factors, the major risk factors were early age at first intercourse (RR = 3.5 for <15 years vs. 21+), number of sexual partners (RR = 2.2 for 2 and for 3+ vs. 1 partner) and multiple live births (RR = 2.8 for 7 to 9 vs. 1 to 3).

Education was used as a measure of socio-economic status. In the crude analysis, women who did not have any formal education had a 2-fold increased risk when compared with those who had 7+ years of education, but after adjustment, no association remained. Similarly, for smoking, the 50% increased risk observed in the crude analysis did not remain after adjustment. Oral-contraceptive use was not associated with risk in the crude analyses. However, an increased risk was observed after adjustment (RR = 1.6 for ever vs. never). A 50% increased risk was observed in relation to partner’s history of venereal disease; after adjustment, however, it was not statistically significant. No association was found with history of abnormal vaginal discharge or abortion in the crude or in the adjusted analysis.

A significant reduced risk remained for IUD use after adjustment (RR = 0.5 for use vs. non-use). A decreased risk was observed for cesarean section, which remained after adjustment (RR = 0.6 for 1+ vs. 0). However, the upper level of the CI was greater than 1.0. The risk observed for widows compared with married women tended to move away from unity after adjustment (crude RR = 0.8 vs. adjusted RR = 0.5) but was not statistically significant. The reduced risk observed for circumcision of the woman’s husband (RR = 0.7) did not change by adding any variable to the model; however, it was not statistically significant.

RR estimates associated with various health-behavior characteristics are shown in Table II. Regular medical examination, physical exercise, breast self-examination and dental visits were not significantly associated with risk of ICC.

Overall, 54.5% of cases reported having had a cervical cytology compared with 81.7% of controls. As shown in Table III, a significantly lower RR of cervical cancer was observed in women who never had a Pap smear compared with women who had at least one smear (crude RR = 1.9 vs. adjusted RR = 0.8). Women who had had their last Pap smear >60 months previously had half the risk of unscreened women, and risk declined with decreasing time since last Pap smear. Adjustment for the variables shown in Table I, using either conditional or unconditional logistic regression, did not appreciably alter the results.

Among women who had had at least one Pap smear in the past 5 years, the risk was reduced by 80% regardless of the number of Pap smears during that time period.

Very few subjects reported symptoms preceding the Pap smears performed during the 5-year period prior to the reference date (5 controls and 7 cases). Those with preceding symptoms had RR = 1.2 compared with unscreened subjects, while women with no symptoms had RR = 0.2.

Of cases with stage IB disease, 35% reported the last Pap smear within 1 to 12 months before the reference date compared with 21% of stage II and 15% of stages III and IV. Conversely, the proportion of cases with no Pap smears in the previous 60 months increased with increasing stage of disease at diagnosis (Fig. 1).

At the interview, 5.6% of cases did not know about the Pap smear vs. 0.6% of controls (Table IV). More than half of both
groups reported that they had known about the procedure for 6 or more years, but 30.7% of controls and 24.4% of cases did not remember the date they learned about the test. More controls than cases learned about Pap smears from health-care providers (64.1% vs. 41.4%). More cases than controls learned about Pap smears from family or friends (34.1% vs. 24.9%). More cases than controls had heard about cervical cancer screening through the mass media (radio, television, newspapers) (9.6% vs. 5.2%) or their school or

### TABLE I – RELATIVE RISK (RR) OF ICC ASSOCIATED WITH PREVIOUSLY REPORTED RISK FACTORS

|                       | Controls | Cases |
|-----------------------|----------|-------|
|                       | Crude    | Adjusted |
|                       | RR (95% CI) | RR (95% CI) |
| **Education (years)** |          |        |
| 7+                    | 59 21    | 1.0    |
| 4–6                   | 88 35 1.1 | (0.6–2.1) | 0.8 (0.4–1.6) |
| 1–3                   | 106 49 1.3 | (0.7–2.4) | 0.8 (0.4–1.6) |
| None                  | 54 38 2.0 | (1.0–3.8) | 0.9 (0.4–2.0) |
| Not known             | 4 0      |
| **Marital status**    |          |        |
| Married               | 200 85 1.0 | 1.0 |
| Divorced              | 23 16 1.6  | (0.8–3.2) | 1.3 (0.6–2.8) |
| Single                | 41 25 1.4  | (0.8–2.5) | 0.9 (0.5–1.8) |
| Widowed               | 47 17 0.8  | (0.5–1.6) | 0.5 (0.3–1.1) |
| **Age at first intercourse (years)** |          |        |
| <21                   | 106 24 1.0 | 1.0 |
| 18–20                 | 82 43 2.3  | (1.3–4.1) | 2.1 (1.1–3.9) |
| 15–17                 | 102 50 2.2  | (1.2–3.8) | 1.9 (1.0–3.6) |
| <15                   | 20 23 5.1  | (2.4–10.7) | 3.5 (1.4–8.4) |
| Not known             | 1 3      |
| **Number of sexual partners** |          |        |
| 1                     | 257 91 1.0 | 1.0 |
| 2                     | 30 25 2.3  | (1.3–4.2) | 2.2 (1.2–4.1) |
| 3+                    | 22 19 2.4  | (1.3–4.7) | 2.2 (1.1–4.4) |
| Not known             | 2 8      |
| **Number of live births** |          |        |
| 1–3                   | 85 19 1.0  | 1.0 |
| 4–6                   | 88 48 2.4  | (1.3–4.5) | 2.4 (1.2–4.7) |
| 7–9                   | 62 42 3.0  | (1.6–5.7) | 2.8 (1.3–5.9) |
| 10+                   | 61 30 2.2  | (1.1–4.3) | 1.8 (0.8–4.1) |
| 0                     | 4 1      |
| **Cesarean section**  |          |        |
| 0                     | 242 122 1.0 | 1.0 |
| 1+                    | 58 18 0.6  | (0.3–1.1) | 0.6 (0.3–1.2) |
| **Number of abortions** |          |        |
| 0                     | 159 67 1.0  | 1.0 |
| 1                     | 68 36 1.2  | (0.8–2.0) | 1.1 (0.7–1.9) |
| 2+                    | 72 37 1.2  | (0.7–2.0) | 1.0 (0.6–1.7) |
| Not known             | 1 0      |
| **Oral contraceptives** |          |        |
| No                    | 202 88 1.0 | 1.0 |
| Yes                   | 109 52 1.1  | (0.7–1.6) | 1.6 (1.0–2.6) |
| Not known             | 0 3      |
| **Intra-uterine device** |          |        |
| No                    | 242 125 1.0 | 1.0 |
| Yes                   | 69 15 0.4  | (0.2–0.8) | 0.5 (0.2–0.9) |
| Not known             | 0 3      |
| **Smoking**           |          |        |
| No                    | 228 93 1.0 | 1.0 |
| Yes                   | 83 50 1.5  | (1.0–2.3) | 1.1 (0.7–1.8) |
| Abnormal vaginal discharge |          |        |
| No                    | 212 93 1.0 | 1.0 |
| Yes                   | 99 48 1.1  | (0.7–1.7) | 1.0 (0.6–1.5) |
| Not known             | 0 2      |
| **Partner’s history of venereal disease** |          |        |
| No                    | 259 105 1.0 | 1.0 |
| Yes                   | 22 13 1.4  | (0.7–3.0) | 1.5 (0.7–3.2) |
| Not known             | 30 25     |
| **Partner circumcised** |          |        |
| No                    | 201 86 1.0 | 1.0 |
| Yes                   | 39 12 0.7  | (0.3–1.4) | 0.7 (0.3–1.5) |
| Not known             | 71 45     |

1Adjusted for age, age at first intercourse, number of sexual partners and Pap-smear use. 2Adjusted for age, age at first intercourse and number of sexual partners. 3Adjusted for age, education, number of sexual partners and number of pregnancies. 4Adjusted for age, education, age at first intercourse and number of pregnancies. 5Adjusted for all variables listed in 1 plus education. 6Adjusted for all variables listed in 1 plus education. 7Adjusted for age, education and Pap-smear use. 8Eleven controls and 3 cases never had been pregnant.
workplace (6.7% vs. 3.9%). Written material was an infrequent source of information in both groups.

As shown in Table V, more controls than cases always learned the results of their Pap smears (82.2% vs. 60.3%). In this analysis, only women who had Pap smears were considered.

## DISCUSSION

Risk factors for ICC identified in this study are consistent with other reports (Brinton et al., 1987; Herrero et al., 1990). This similarity of our findings with those of others provides confidence in the validity of our study methods and, thus, supports the observed relationship of Pap smears to reduced risk of ICC in Guadalajara.

The apparent protective effect associated with having had at least one Pap smear was 70% (RR = 0.3) compared with unscreened women. Estimates from our study are slightly lower than those from other studies that included Mexican women. Herrero et al. (1992) reported a risk of 0.4 for those who had ever had a Pap smear compared with those who never had one, while Hernández-Avila et al. (1998) found an RR of 0.38 for women who had ever had a Pap smear without gynecologic symptoms compared to those with no previous Pap smears.

Even though all factors associated with disease in our study were included in the regression models, no effect was observed in the RR estimates of screening history. A similar situation has been observed in other studies, with no effect or only slight differences reported after adjustment (Clarke and Anderson, 1979; Herrero et al., 1992; Macgregor et al., 1985). It is possible that some residual confounding exists for variables that we were not able to assess. However, since a strong association was observed, we consider it unlikely that any important confounding variable could have been overlooked.

Using the RR of 0.3 estimated in this study, 45 of the 65 cancer cases among women who reported a negative history of Pap smears would have been prevented if they had ever had a Pap smear (prevented fraction 1 - RR = 70%) (Greenland and Rothman, 1998).

### TABLE II – RELATIVE RISK (RR) OF ICC ASSOCIATED WITH SOME VARIABLES OF HEALTH BEHAVIOR

|                   | Controls | Cases | Crude RR (95% CI) | Adjusted RR (95% CI) |
|-------------------|----------|-------|-------------------|----------------------|
| Regular medical examination¹ |          |       |                   |                      |
| No                | 278      | 128   | 1.0               | 1.0                  |
| Yes               | 32       | 12    | 0.8 (0.4–1.6)     | 1.0 (0.5–2.1)        |
| Not known         | 1        | 3     |                   |                      |
| Physical exercise¹ |          |       |                   |                      |
| No                | 256      | 122   | 1.0               | 1.0                  |
| Yes               | 54       | 18    | 0.7 (0.4–1.2)     | 0.9 (0.5–1.6)        |
| Not known         | 1        | 3     |                   |                      |
| Breast self-examination² |          |       |                   |                      |
| Never             | 153      | 75    | 1.0               | 1.0                  |
| Sometimes         | 79       | 38    | 1.0 (0.6–1.6)     | 1.1 (0.6–1.9)        |
| Regularly         | 78       | 26    | 0.7 (0.4–1.1)     | 1.1 (0.6–2.0)        |
| Not known         | 1        | 4     |                   |                      |

¹Adjusted for age and Pap-smear use. ²Adjusted for variables listed in ¹ plus age at first intercourse and number of sexual partners.

### TABLE III – AGE-ADJUSTED RELATIVE RISK (RR) OF ICC ASSOCIATED WITH DIFFERENT SCREENING PRACTICES

|                   | Controls | Cases | RR (95% CI) |
|-------------------|----------|-------|-------------|
| Pap smears        |          |       |             |
| Never             | 57       | 65    | 1.0         |
| Ever              | 254      | 78    | 0.3 (0.2–0.4) |
| Months since last Pap smear (before reference date) | | | |
| Never Pap smears  | 57       | 65    | 1.0         |
| >60               | 42       | 24    | 0.5 (0.3–0.9) |
| 13–60             | 59       | 18    | 0.2 (0.1–0.5) |
| 1–12              | 126      | 33    | 0.2 (0.1–0.4) |
| Not known         | 27       | 3     |             |
| Number of Pap smears during 5-year period (1–60 months) | | | |
| Never Pap smears  | 57       | 65    | 1.0         |
| Pap before 5-year period only | 42 | 24 | 0.5 (0.3–0.9) |
| Pap during 5-year period | | | |
| 1                 | 61       | 16    | 0.2 (0.1–0.4) |
| 2–3               | 46       | 14    | 0.2 (0.1–0.5) |
| 4+                | 95       | 23    | 0.2 (0.1–0.4) |
| Not known         | 10       | 1     |             |
| Pap because of symptoms during 5-year period | | | |
| Never Pap smears  | 57       | 65    | 1.0         |
| Pap before 5-year period only | 42 | 24 | 0.5 (0.3–0.9) |
| Pap during 5-year period | | | |
| No symptoms       | 195      | 45    | 0.2 (0.1–0.3) |
| With symptoms     | 5        | 7     | 1.2 (0.3–3.9) |
| Not known         | 12       | 2     |             |
In Guadalajara, cervical cancer is the leading cause of death due to cancer among women 35 years of age and older. Although the Pap smear screening program started 24 years ago, the mortality rate for cervical cancer has been increasing (SSJ, 1996). A cross-sectional study carried out in 1994 in Mexico City (urban area) and Oaxaca (rural area) found that 64% and 30%, respectively, of the women had ever been screened (Lazcano-Ponce et al., 1998). In this study, 45% of cases had never had a Pap smear and almost two-thirds had not had one in the past 5 years. The study in Mexico City showed that 56% of the ICC cases had never had a Pap smear (Hernández-Avila et al., 1998). New strategies should be developed in Mexico to increase the coverage of cervical cancer screening.

Rescreening of women should receive lower priority than initial screening and could be done as infrequently as every 5 years with little loss of overall benefit. In this study, women last screened 13 to 60 months earlier had the same level of protection as women last screened from 1 to 12 months previously, though, as observed by others (Parkin, 1990), the correlation between interval since last Pap smear and stage at diagnosis suggests some added benefit of screening more frequently than every 5 years if resources to do so are available. Parkin (1990) estimated the effects on ICC incidence of different screening policies, using the results from the International Agency for Research on Cancer collaborative study and the incidence rates observed in Cali, Colombia. He concluded that even very low-intensity programs, with 2 to 4 tests in a lifetime spaced out at 10-year intervals, could reduce the incidence of ICC by 40% to 60%, assuming that all women are screened. By contrast, a program of tests every 5 years at ages 20 to 64 attended by only a third of the population at risk would reduce incidence by only about 28% yet would require about the same number of Pap smears.

Our findings support the 1996 regulation for the Cervical Cytology Screening Program in Mexico, published by the Secretariat of Health. This regulation changes the frequency of screening from 1 to 3 years and the age group from all women to women between 25 and 64 years old. The new regulation emphasizes screening high-risk subjects: women over 35 with an active sexual life, those who have never had a Pap smear and those who have a history of repeated episodes of sexually transmitted diseases (SS, 1996). The risk factors for cervical cancer identified in the present study confirm that these recommendations do in fact target high-risk women. The Secretariat of Health is the leading agency of the National Health System and the one which exercises general political and regulatory leadership in the health sector. Consequently, this regulation will be applied at the public institutions of the Mexican National Health System.

In addition to coverage and frequency of Pap smears, it is important to assess the actual quality of the Pap smears performed. A study was carried out in 16 cervical cancer screening centers of the IMSS and the Secretariat of Health distributed across Mexico (Jalisco was not included), to evaluate the diagnostic precision of cervical cytology. Each center received a batch of 90 cytologic specimens with a random positive prevalence of 1.5% to 36%. The gold standard was an expert pathologist certified by the Mexican Board of Pathology. Positive cases were histologically confirmed. There was a false-negative rate ranging from 10% to 54% independent of the prevalence of positive cases (Lazcano-Ponce et al., 1997a). In a study carried out in a hospital in Mexico City, 64.1% of a random sample of specimens lacked endocervical cells and the quality of the specimens was rated good in only 11% and high in 7.7%. The correlation between diagnostic error and the quality of the Pap smear was 0.87 (Lazcano et al., 1992). Although the present study provides evidence for a strong protective effect against ICC, some women who had received a Pap smear in the past 5 years, and even some screened in the past 2 years, had ICC. These women might have had rapidly progressing disease, but the most likely explanation is that prior Pap smears were false-negative. Efforts should be made to monitor the quality of Pap-smear reading in any cervical cancer screening program.

Since cytologic histories were not validated in this study, there may have been errors in the classification of Pap smear histories. In general, what may occur in the case-control design is that cases recall their exposure better than controls (Schlesselman and Stolley, 1982). Walter et al. (1988) compared the Pap-smear history obtained from patients' reports with information obtained from their physicians. It was found that cases and controls reported more smears over the previous 5 years than their medical records indicated. Cases had better agreement on the timing of their most recent smear, while controls tended to underestimate the time since their most recent smear. If a similar situation occurred in this study, we would underestimate the protective effect of the Pap smears.

There has been some criticism about the selection of controls from health centers since these women might have higher screening rates than the general population because of greater utilization of health-care services. Information was sought on the number of consultations the patient had had with a doctor during the 5 years before diagnosis. Controlling for this variable showed no difference in the estimates of the different screening practices. However, 49.8% of cases and 32.2% of controls did not remember the number of consultations they had had during that period.

It is necessary to develop health-care-education strategies that go beyond acquisition of knowledge and actually change the practice of Pap-smear screening. In this study, more than half of both groups reported long-term familiarity with the procedure. A study performed in Colombia reported similar results (Aristizabal et al., 1984).

Health-care personnel should be actively involved in the education of the population since they can have an important influence. The cases in this study had obtained information from health-care institutions less frequently than controls.
Special attention should be given to reporting Pap-smear results to the screened women. In this study, even in the control group, not all of the women who had had a Pap smear knew of their results. It has been estimated that in Mexico one-fifth (18.5% to 22.2%) of screened women never receive their results (Lazcano et al., 1996). Pre-invasive conditions identified in such women will therefore remain untreated, severely reducing the effectiveness of the screening program.

In the new regulation for the Cervical Cytology Screening Program in Mexico, particular consideration is given to reporting Pap-smear results and to surveillance of the quality of the cytologic smears (SS, 1996). Studies should be developed to assess whether these recommendations are being applied.

In summary, we have shown that Pap smears in the metropolitan area of Guadalajara are of sufficiently good quality to substantially reduce the risk of ICC. This may not be a valid assumption for all places. The following recommendations for their use would maximize the impact of a screening program:

1. Concentrate efforts on screening women who have never been screened.
2. Screen women every 5 years, not more frequently unless the woman is at unusually high risk or has a suspicious smear. Increase the frequency to every 3 years if the resources are available to do so, without reducing the proportion of women in the population who are screened.
3. Enhance efforts to contact every woman with an abnormal smear, for further evaluation.
4. Monitor the quality of the Pap-smear reading.

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