

**Pap test utilization and opportunity to be screened in women diagnosed with
cervical cancer**

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Competing Interests

The authors of this document report no competing interests that could bias the results of this study.

Abstract

Background: The incidence of cervical cancer can be reduced and the disease largely prevented by Pap test screening. Unfortunately, a proportion of women are still not screened. The objectives of this study were to examine the screening history of women who have been diagnosed with invasive cervical cancer in Manitoba and to explore whether or not opportunities were missed for screening in the province.

Methods: A case control design of all Manitoba female residents who were diagnosed with invasive cervical cancer between 1989 and 2001 and matched by age and area of residence to 5 controls per case was used (total N=4066). Conditional logistic regressions and generalized linear regressions using the Poisson distribution were used to analyze the association between invasive cervical cancer and Pap test utilization and differences in the opportunity to be screened between cases and controls. A logistic generalized estimating equation model was used to examine the probability of having a Pap test by physician characteristics.

Results: Fifty-three percent of Manitoba women diagnosed with invasive cervical cancer compared to 33% of controls did not have a Pap test in the 5 years prior to the case's diagnosis. Women who did not have Pap tests had almost three times the risk of developing cancer (OR 2.77, 95% CI 2.30-3.30). For women in the study, those who lived in urban areas and those with a higher income had more Pap tests and a lower risk of being diagnosed with cervical cancer. Although women diagnosed with invasive cervical cancer had fewer Pap tests, they had the same opportunity to be screened as controls (RR 1.04, 95% CI 0.96-1.12). Certain physicians such as obstetricians and gynecologists, female physicians, and urban physicians provided more Pap test.

Conclusions: The results of this study confirm that women who have been diagnosed with invasive cervical cancer had fewer Pap tests but had the same opportunity to be screened as matched controls.

Key words: cervical cancer, Papanicolaou test, delivery of health care

Introduction

Although the rates of cervical cancer are low in Canada, it is one of the few diseases for which the incidence can be further reduced and the disease largely prevented. This is achievable through the detection of precursor lesions and early stage cancers in large populations of asymptomatic women using the Papanicolaou test (Pap test)¹, by promoting the test among women and physicians and by appropriately following up abnormal results². Despite the evidence that screening using a Pap test decreases the incidence of cervical cancer and the efforts to promote screening, a proportion of women are still not screened³.

There are several reasons identified in the literature why women do not obtain cervical cancer screening. Patient factors that influence screening include socio-economic and demographic characteristics, and knowledge, attitudes, and beliefs about cervical cancer³⁻⁹. The probability of being screened tends to increase with education and income and is lower for non-Canadian born women, those who do not speak English, and women who have more negative beliefs about cancer^{6,8,9}. System and physician factors that influence screening include a lack of regular care, inability to access screening services by women, and health providers missing the opportunity to screen¹⁰. Missed opportunities refer to instances when a woman has contact with a healthcare provider but the provider does not perform or recommend the screening test¹⁰. Physician characteristics that have been associated with missed opportunities to provide preventive care such as a Pap test include type of specialty, previous education, gender, and practice location¹¹⁻¹⁴.

The objectives of this study were to examine the screening history of women who have been diagnosed with invasive cervical cancer and explore whether there were missed opportunities for screening in the province.

Methods

Study design and population

This study used a case-control design. Cases included all Manitoba females 18 years of age and older who were diagnosed with invasive cervical cancer between 1989 and 2001. Eighteen years of age was chosen as this is the beginning of the target age group for the Manitoba Cervical Cancer Screening Program. Five controls were selected for each case. Controls must not have had cervical cancer or any other malignant neoplasms excluding non-melanoma skin cancer. Women who had a total hysterectomy were excluded. Only cases and controls that were Manitoba residents for the entire time period extending from 1984 to 2001 were included (1984 was chosen to provide at least 5 years of data on cases diagnosed in 1989). Cases and controls were matched by age at index date (± 1 year) and area of residence using the forward sortation area (i.e., first three digits of the postal code). Ethics approval was received from the Health Research Ethics Board at the University of Manitoba and the Health Information Privacy Committee (HIPC) at Manitoba Health. This study was supported by a grant from the CancerCare Manitoba Foundation.

Data Sources

Cases of cervical cancer were identified through the Manitoba Cancer Registry (MCR) and controls through the Manitoba Health Insurance Plan Registration File (MHPR). The MCR is a population-based registry that records all new cancer patients

who are Manitoba residents at the time of diagnosis. The provincial Health Department maintains the registration file for the purpose of administering the Manitoba Health insurance plan. Manitoba residents are not required to pay any premiums for health insurance, which ensures that virtually everyone is included in the MHPR. A record on the MHPR is created when a person registers with the health insurance system. There is also a termination date and code when a person dies or migrates out of the province.

The Manitoba Physician Claims Database was used to determine Pap test utilization and hysterectomy status. This database is generated by claims filed by physicians for payment of services and includes a billing tariff code and the date of service. All possible Pap test tariff codes were used in this study and include Pap tests done during a complete history and physical examination and Pap tests done during a regional intermediate visit. Physician data including specialty, gender, graduation date, and graduation location (Canadian versus foreign graduate) were abstracted from the Physician Master File. Data derived from the 1996 Canadian Census was used to determine average household income.

Missed opportunity to be screened

A missed opportunity to be screened was defined as any visit to a physician during the five years prior to the diagnosis of the case excluding visits during which a Pap test was done or visits that occurred less than 10 months after a Pap test. The six months prior to the diagnosis of the case was also excluded to rule out Pap tests that may have been done for diagnostic rather than screening purposes. A brief analysis of Pap test frequency and physician type found that general practitioners, internal medicine

specialists, obstetrician/gynecologists, general surgeons, emergency medicine physicians, and pediatricians provided most Pap tests and were therefore included in the study.

Data analysis

Conditional logistic regressions and generalized linear regressions using the Poisson distribution were used to analyze the association between invasive cervical cancer and Pap test utilization and differences in the opportunity to be screened between cases and controls. A logistic generalized estimating equation model that allowed us to account for correlated data within the dataset was used to examine the probability of having a Pap test by physician characteristics. Data analyses were performed using SAS (v9.1)¹⁵.

Results

Rate of Pap tests

A total of 4,066 women were included in the study (678 cases and 3,388 controls). The mean age at the time of diagnosis was 50.2 years. The mean income was \$39,175 for cases and \$42,280 for controls. In the five year time period prior to the diagnosis date of the case, 63% of all women had at least one Pap test but this was unevenly distributed between cases and controls (Table 1). Only 46.5% of women of cases had a Pap test compared to 66% of controls. The mean number of Pap tests was 0.87 for cases and 1.38 for controls.

After adjusting for age, income, and residence, the rate of Pap tests was significantly higher for controls (Table 2). Age and income both had a significant effect on the rate of Pap tests; older women had a lower rate of Pap tests and women with higher incomes had a higher rate of Pap tests. Region of residence was also significant;

urban women had a higher rate of Pap tests than rural women. However, unlike other health outcomes where the relationship between income and various health measures depends on where you live, there was no interaction between region of residence and income in this analysis.

Risk of Cervical Cancer

Multivariate analyses on the factors affecting the risk of cervical cancer indicated that women who did not have a Pap test in the 5 years prior to diagnosis had a much higher risk of invasive cervical cancer (Table 3). Women who had a higher income had a lower risk of cervical cancer. Again, there was no significant interaction between residence and income.

Screening Opportunities

A multivariate generalized linear model on the number of opportunities to be screened indicated that the mean number of opportunities to be screened in the 5 years prior to diagnosis was 17.81 for cases and 18.29 for controls. This difference between cases and controls was not significant (Table 4). Age at diagnosis and income both had a significant effect on the opportunities to be screened; older women had more missed opportunities and wealthier women had fewer missed opportunities (Table 4). There was no effect of area of residence (urban versus rural) on missed.

Physician Characteristics

Analyses using generalized estimating equations were conducted to determine whether physician characteristics were associated with the likelihood of a Pap test being administered during a visit deemed an opportunity to be screened (N=74,040). There was no difference in the provision of Pap tests between rural and urban family practitioners.

Specialists, however, provided more Pap tests than their urban FP counterparts (Table 5). These observations were independent of patient age and patient income. Location of graduation (Canadian versus foreign), physician gender and practice type were available for 53% of the visits deemed an opportunity to be screened (N=39,395). Canadian graduates, female physicians, and specialists provided more Pap tests. As a proxy measure of age, year of graduation was also examined. Recent graduates were more likely to provide a Pap test compared to older graduates but this effect was not consistent over time (OR 1.11 95% CI 1.01-1.23).

Discussion

The Pap test is one of the most effective tools available for the early detection of cancer. However, full effectiveness has not yet been reached. This study found that many Manitoba women diagnosed with invasive cervical cancer did not have a Pap test in the 5 years prior to diagnosis. Women who did not have Pap tests had almost three times the odds of developing invasive cervical cancer. However, although women diagnosed with invasive cervical cancer had fewer Pap tests, they had the same opportunity to be screened as study controls.

These Manitoba findings are consistent with previous research that has investigated the relationship between Pap test utilization history and the risk of cervical cancer; these studies reported a two-fold increased risk of cervical cancer for non- and irregular users¹⁶⁻²⁰. Studies in other jurisdictions have also found that a high percentage of women diagnosed with invasive cervical cancer had multiple contacts with the health care system in the 3 to 5 years preceding diagnosis but had not been screened for cervical cancer²¹⁻²⁴.

One possible reason for our finding that controls had the same opportunity to be screened may be that under-screened women lack continuity of care or a relationship between themselves and their health care provider. They may also be more likely to visit a physician only for acute problems. If they do not receive screening at that time, they most likely remain unscreened. In Manitoba, a steady relationship between continuity of care and better preventive health care has been observed²⁵. Therefore, having an ongoing relationship with a family practitioner is important even with universal access to health care. Although preventive services may not traditionally be offered in walk-in clinics, they can be successful: 55% of patients who attended one inner-city walk-in clinic for an acute medical problem and who were inadequately screened accepted a same day appointment for a Pap test²⁶.

Women who lived in urban areas and those with a higher income had more Pap tests and a lower risk of being diagnosed with cervical cancer. Other research has also found that cervical screening is provided more consistently in urban than rural areas and that Pap tests decrease with decreasing income²⁷⁻²⁹.

Our study found that certain physicians such as obstetricians/gynecologists, female physicians, and urban physicians provided more Pap tests. The obstetrician's /gynecologist's increased provision of Pap tests may relate to their specific training and focus on women's health. Previous research has found that women who see obstetricians/gynecologists are more likely to be younger, have higher levels of education and income, and therefore may request a Pap test more frequently³⁰. This is particularly worrisome since fewer women see an obstetrician/gynecologist as they get older, yet cervical cancer incidence and mortality rates are higher among older women². Therefore,

the physicians most likely to treat older women may be the least likely to provide a Pap test.

Patients of female physicians were also more likely to receive Pap tests. Female physicians have been found to devote more time to preventive services than male physicians even when patient gender and health status were controlled³¹⁻³³. This gender effect may be associated with a number of factors. It may be easier for female physicians to perform cervical screening because there is gender concordance with their patients. The unavailability of a female chaperone may affect male physicians' ability to complete the Pap test. Nevertheless, obstetricians /gynecologists do not seem to experience these barriers to screening to the same degree based on their rates of Pap test provision. Patient factors may also play a role. Women may feel even less comfortable with a male physician performing the test. However, in one study female patients were no more likely to refuse an exam from a male physician than from a female physician³².

An interesting finding is that the provision of Pap tests seems to peak at 10 years after graduation. One early study also found a concave relationship between years in practice and adherence to standards of practice³⁴. Physicians in practice for 6 to 15 years provided more Pap tests than physicians with more or fewer years of experience. However, a systematic review of studies that evaluated the relationship between clinical experience and performance found that physicians in practice for more years and older physicians were less likely to adhere to appropriate standards of care³⁵.

This study has several important strengths. Information on all cancer cases diagnosed over a 12-year time period was included making this study very comprehensive. In addition, many previous studies collected data from patient and

physician surveys introducing the possibility of non-response, recall, interviewer, and acquiescence bias³⁶. By collecting Pap test history and health provider information from linked Manitoba Health administrative databases whose reliability has been extensively evaluated, these sources of bias were eliminated. Information on hysterectomy was also available which was an important limitation in previous studies that used administrative data to examine Pap test utilization³⁷.

This research, however, was not able to differentiate between a patient's refusal to have a Pap test and the physician not performing the test. In addition, Pap tests for a small number of physicians who are salaried and do not submit claims for the services they provide may not be captured. This could result in fewer Pap tests than were actually provided although it is estimated that the physician claims data captures 95% of all Pap tests performed in Manitoba^{4,17}. Finally, data on whether or not a physician was a Canadian graduate, graduation year, and physician sex was incomplete and therefore the results must be interpreted cautiously.

The results of this study confirm that women who have been diagnosed with invasive cervical cancer had fewer Pap tests but had the same opportunity to be screened as matched controls. So, although some women may not get a Pap test because they do not visit a health care provider, a lack of contact with the health care system is not the main reason why many women are under-screened. These results reinforce the necessity for health care providers to seek every opportunity to educate women about preventive cervical cancer screening and provide Pap tests regardless of the location of care and the continuity of the relationship with the patient.

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