# Cervical Screening with the Davis Pipet on a Door-to-Door Basis

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THE RECORDS of the Rhode Island Division of Vital Statistics indicate that more than 80 percent of the deaths from cervical cancer in Providence for the years 1962 through 1966 occurred in the inner city, where those in the lowest socioeconomic groups live.

The inner city comprises 16 of Providence's 37 census tracts. The 16 tracts contain 40 percent of all female residents of the city and 85 percent of all Negro females. Negro females comprise 7.5 percent of the entire population of the city, and in the inner city the proportion is more than double, 16 percent. The population figures are based on a special 1965 census of the State.

Epidemiologic evidence indicates that there is a socioeconomic pattern in the occurrence of cervical carcinoma in the United States. Low income, marriage at an early age, and multiple pregnancies have been discovered to be factors in incidence and, although limited population groups have enjoyed the benefits of periodic cytologic screening, the broad mass of high-risk women has not been screened. Cancer clinics where the traditional Papanicolaou smears are available are not widely used by the women living in the inner city.

Rhode Island, the smallest State, is also the most densely populated. The 900,000 residents are grouped into 186 census tracts, each with about 4,000 people having similar socioeconomic characteristics (*1*). Rhode Island is the only State with its entire area included in census tract enumeration. Census data on these tracts aid the health department in determining where the greatest and most pressing needs in public health exist. The Office of Economic Opportunity established nine neighborhood health centers in Providence census tracts with low socioeconomic indexes. Traditional Papanicolaou smears were made available at these centers by the health department's chronic disease program.

## Pilot Study

The staff of the department of health hoped that a more active and forceful program, during which the women in the target area would be contacted personally, would increase the number of women in whom cervical cancer would be discovered in early curable stages. Based upon this premise, a pilot study (*2*) using the Davis pipet irrigation smear was started in one census tract of the city.

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Census tract No. 27 was chosen for the pilot study, primarily because it contained a 600-family low-income housing project in which one of the neighborhood health centers of Progress for Providence was located. (Progress for Providence is the OEO program providing comprehensive health, educational, and social services in poverty areas of the city.)

The objective of the pilot study was to obtain smears using the Davis pipet. The Progress for Providence neighborhood health aides were used to obtain specimens in door-to-door visits and to relate this program to the women in the target area.

A training program was undertaken by the Rhode Island Department of Health to familiarize Progress for Providence staff with the purpose and goals of the project.

The program was under the direction of a physician and a registered nurse from the department. The health center aides were first shown a training film portraying the difference between results when routine preventive care was used and when it was not used in cervical cancer examination and detection. Simple anatomical diagrams of the female reproductive organs were shown, and the primary site of cervical cancer identified. The Davis pipet was shown, the steps in its use and function thoroughly explained, and each health aide used the pipet personally in her own home.

The 161 women approached in the pilot study consisted of about 6 percent of the reported 1965 female population of the tract. Additional selected population data for the entire city and for the tract follow.

| *Item* | *Providence (N= 187,061* [1]) | *Census tract 27 (N= 5,189* [1]) |
|---|---|---|
| Percent of city's population | 100 | 2.8 |
| Percent of population female | 52.6 | 54.8 |
| Percent of female population Negro | 7.5 | 13.7 |
| Percent of females in 15–44 age group | 37.0 | 38.3 |
| Percent of total population: | | |
| Under 21 years | 36.0 | 42.7 |
| 21 years or older | 64.0 | 57.3 |
| 65 years or older | 13.6 | 11.4 |
| Median age of total population (years) | 33.1 | 26.6 |
| Median age of females (years) | 36.2 | 28.6 |

[1] 1965 population.

Following are comparative data on various health indices for the city and the census tract (*3*).

| *Item* | *Providence* | *Census tract 27* |
|---|---|---|
| Live births per 1,000 population | 17 | 16 |
| Premature births per 1,000 live births | 104 | 71 |
| Illegitimate births per 1,000 live births | 107 | 106 |
| Births per 1,000 women 15–44 age group | 86.2 | 78.1 |
| Annual number of newly active cases of tuberculosis | 47 | 4 |
| Cases of venereal disease per 100,000 | 341 | 289 |
| Deaths per 100,000 from all types of cancer | 255 | [1] 231 |
| Deaths per 100,000 females from cervical cancer | 14.2 | ---------- |
| Deaths per 100,000 from all forms of heart disease | 621 | 443 |

[1] The few deaths of tract 27 residents may cast doubt on the statistical reliability of rates for individual census tracts.

Every attempt was made to assure that the volunteer workers were able to present the program to participants in terms of its purpose, goal, and self-administering techniques. After the briefing the aides went door to door, meeting the women, explaining the use of the Davis pipet, and waiting until the woman had collected the specimen. If the woman was not able to collect the specimen on the first visit, the health aide made plans to return at a convenient time.

The door-to-door feature removed many barriers, such as cost, inconvenience, time, and embarrassment. For any woman whose specimen had atypical cells, a Papanicolaou smear and biopsy were arranged through the neighborhood health center. Complete medical care for women with confirmed cases was also arranged.

### The Davis Method

The Davis method uses a plastic pipet containing an irrigation solution. Its major advantage in testing is that it can be used by women at home following simple instructions. At present the complete kit, that is, the filled cyptopipet with instructions for use and a mailing container, is not available commercially in the United States.

The pipets used in Rhode Island were obtained from Denmark, and they were filled in the health department laboratories with solu-

tion supplied by Dr. Hugh Davis, Johns Hopkins University School of Medicine, the initiator of the technique. There was no need for instructions and mailing containers because the health aides went from door to door, gave direct instructions, retrieved the pipet immediately after use, and brought it back to the neighborhood health center.

The pipets were taken once a week from the health center for evaluation at the Institute of Pathology of St. Joseph's and Our Lady of Fatima Hospitals. Personnel of the institute are experienced in evaluation. They have been doing cytology on specimens from oral washings for dentists, and they have conducted a school of cytotechnology for 5 years. Finally, appropriate followup was initiated for those cases indicated.

### Project Extended

The pilot study, which was started in August 1967 in one neighborhood center, has been extended to the other eight centers with varying success. In the original census tract chosen (No. 27), approximately 9 hours were spent by each of the four health aides in door-to-door visits. Of the 161 women approached in the original group, 68 (42.2 percent) participated by collecting a specimen; 21 (13.1 percent) refused to participate, saying they were too old or not interested, and 72 (44.7 percent) did not participate because of a pregnancy, baby less than 6 weeks of age, Papanicolaou smear within 6 months, menstruation, or sexual intercourse or douche within 24 hours. (It was not possible to determine from the records how many of the original 72 nonparticipating women were tested later in the followup program.)

Apart from the justifiable nonparticipants (44.7 percent), a significant aspect of the door-to-door method versus the mailing technique would seem to lie in the relatively low refusal rate of 13.1 percent. Return rates from similar projects in Florida and Maryland, for example, seem to indicate what may be called a presumed refusal rate of from 20 percent to 42 percent, which is substantially greater than the rate in the door-to-door project (*4*, *5*).

When the program was extended to all nine neighborhood health centers, a total of 417 women participated between August 1967 and May 1968. The cytology results for the nine centers as of May 15, 1968 are given in the table.

Unsatisfactory results for 31 women appear to stem from two reasons. The first reason was lack of cells. Although the aides were trained to examine the pipet and ascertain that the fluid was cloudy, sometimes in doubtful cases the aide hesitated to ask the patient to repeat the test. Unless there were a minimum of 100,000 cells in the specimen, there were not enough cells to examine. The use of the wrong orifice, that is, the urethra or rectum, was the second reason for unsatisfactory results. The solution evidently does not cause irritation in these areas because no complaints were received from patients. A clue to the wrong technique is a brownish solution, which means that there is some fecal material present, as compared with a solution which will be smoky or cloudy only, but has not changed color. The 31 women with unsatisfactory takes were encouraged to have a repeat test.

Of the 17 women having atypical tests (15 class II and two class III), 10 were retested; four were reported negative and six again showed atypical results. Of the six women showing atypical results, three were retested a third time and again had atypical cells. Additional tests will be made on these women. The remaining seven are under observation. Interestingly enough, of the 17 who had tests with atypical

**Cytology results of tests of 417 women from lower socioeconomic areas of Providence, R.I., August 1967–May 1968**

| Class [1] | Number | Percent |
|---|---|---|
| I Definitely negative | 369 | 88.5 |
| II Most probably negative | 15 | 3.6 |
| III Possibly positive | 2 | .5 |
| IV Most probably positive | 1 | .2 |
| V Definitely positive | 0 | ---- |
| U Unsatisfactory | 31 | 7.4 |
| Total | 417 | [2] 100.2 |

[1] Class I=absence of atypical or abnormal cells, class II=atypical cells but no evidence of malignancy, class III=cells suggestive of, but not conclusive for malignancy, class IV=cells strongly suggestive of malignancy, and class V=cells conclusive for malignancy, and U=insufficient cells for accurate diagnosis or use of wrong orifice.

[2] One 22-year-old woman is included twice. Originally in class II, she became class IV, 4 months later during followup.

cells, only two had had previous Papanicolaou smears. One of the 15 with class II results was a 22-year-old woman who progressed to class IV 4 months later during followup. She has now had conization of the cervix, which revealed atypical hyperplasia and active chronic cervicitis. This patient is being reexamined at regular intervals.

Of the 417 women participating in the project to mid-May 1968, only 180 (43 percent) had had previous tests, and 220 (53 percent) had never had a smear. There were 17 others (4 percent) who did not indicate whether they had had a smear taken previously.

### Comments

This method of cervical cancer detection was a new concept in screening in Rhode Island, because it used the neighborhood health aides and the Davis pipet. The aides are known and well-accepted by their peers. The majority of the aides were enthusiastic in carrying out the program and claimed that they received a favorable response from the community. Other factors important in the evaluation were the response of the community and time spent in door-to-door contact, as well as the cytology results.

The costs of the project—or more exactly the cost of continuing similar projects—may be approximated in terms of the experience in Providence. The Davis pipet, imported from Denmark, costs approximately 25 cents. This cost includes the cost of the solution and readying the kit for use by the participant. Hospitals which participated in the program were paid $4 for each laboratory examination made, including the interpretation and classification of the smear results. The time of the health aides during the pilot study was of no cost to the program, because this was considered to be one of the adjunct services for which they were on the Progress for Providence payroll. In the continuation program, however, Progress for Providence aides are now paid a $2 fee for each specimen collected which can be satisfactorily analyzed. The unit cost in an ongoing program can be assessed at about $6.25 per analyzable sample obtained.

A recent information summary from the Federal Cancer Control Program on the vaginal irrigation method in cervical cancer detection listed, in addition to a bibliography, other facts concerning this method (*6*).

The processing and interpretation of specimens require a technique which is different from that used with conventional smears. As previously mentioned, it was fortunate that technologists already trained in evaluating irrigation specimens from oral cavities were available.

In addition, the reliability of the method has not been perfected. Davis has reported the accuracy of the method to be about 96 percent overall. Anderson and Gunn (*4*) have reported 73 to 84 percent accuracy and Mattingly and co-workers, 87 percent. (*7*) The results of the tests made in Providence have not been studied as yet for accuracy. More than half of the women, however, had never had a Papanicolaou smear, and even if the results for only 80 percent of these women were accurately reported, this achievement means that almost 50 percent have had at least one screening and hopefully will be educated to seek subsequent examinations at more or less regular intervals.

Because this method is for selective screening of asymptomatic women who are not reached by other means, arguments for using the device are based on the conclusions that routine repeat smears will eventually detect almost all early cervical cancers in a population and that up to 7.2 cancers in situ per 1,000 have been detected by the method.

The May 6, 1968, issue of *AMA News* carried a report of a 2-year study showing that this do-it-yourself test was as accurate as Papanicolaou smear examinations by physicians. According to Dr. Robert Hilker, medical director of the Illinois Bell Telephone Company, some 3,000 women employed by the telephone company participated in a test that used the Davis technique.

A paper presented May 21, 1968, by Davis (*8*) at the Third International Congress of Cytology described a screening program carried out in Washington County, Md., on women in the age group 30 through 45. The program started in 1963 and in 5 years' time, after detection and treatment of preinvasive disease, only three invasive cancers were observed in 10,000 women at risk. In the same 5-year period, in the population not screened and not treated for preinva-

sive disease, the risk of invasive cancer was 80 per 10,000 women at risk, or 27 times greater than in the screened population.

## Conclusions

The Davis self-obtained irrigation smear technique is suitable for a community cervical cancer detection program. Neighborhood health aides are able to explain the technique and collect the specimens door to door, thus assuring a 100 percent rate of return, except for nonparticipants with justifiable and personal reasons for refusing for one cause or another.

The participant is able to collect her own specimen. Although the number of unsatisfactory results was low, it can be further lowered as the health aides gather experience in explaining the technique to the participant and in preliminary evaluation of the pipet.

This pilot study, utilizing the Davis method and personal contact by neighborhood health aides, was effective in reaching target women in the high-risk group who are not receiving Papanicolaou smears. More than half of the women had never had a smear, and only two of the 17 women having atypical cells had had previous smears.

The neighborhood health aide can be an important factor in successful public health programs.


## Summary

In August 1967, a cervical cytological screening pilot study was initiated by the Rhode Island Department of Health. Four health aides from a neighborhood health center were sent, after being briefed as to the requirements of the program, on a door-to-door campaign in one census tract of the inner city of Providence with a high mortality rate from cancer of the cervix.

The health aides explained the use of the Davis cyptopipet to the women in their homes, waited for the specimens to be collected, and brought them back to the center.

From the 161 women contacted in the pilot study, 68 specimens (42 percent) were collected, of which five showed atypical cells. The refusal rate was 13 percent; 44 percent could not participate for legitimate reasons, such as menstruation, pregnancy, or sexual intercourse or a douche within 24 hours.

The program was then extended to all nine neighborhood health centers of Progress for Providence, an Office of Economic Opportunity program, and by May 15, 1968, a total of 417 women had participated. Fifty-three percent of these women had never had a Papanicolaou smear. Atypical smears were discovered in 17 women; only two of these women had had previous Papanicolaou smears. All women with atypical results were followed, and medical care was provided as necessary.


## REFERENCES


(1) U.S. Bureau of the Census: Special census of Rhode Island, October 1, 1965. Census tract map. Series P–28, No. 1393, Jan. 24, 1966.

(2) Rhode Island Department of Health: Report of cervical cancer detection pilot study. State plan supplement. Ch. 2, appendix I, October 1967. Mimeographed.

(3) Rhode Island Department of Health, Office of Program Development: Selected health indices for Rhode Island. Providence, 1968.

(4) Anderson, W. A. D., and Gunn, S. A.: The vaginal irrigation smear: reliability in detection of premalignant and malignant conditions of the uterine cervix in asymptomatic and symptomatic patients. JAMA 200: 166–167, Apr. 10, 1967.

(5) Davis, H. J., and Jones, H. W., Jr.: Population screening for cancer of the cervix with irrigation smears. Amer J Obstet Gynec 96: 605–618, Nov. 1, 1966.

(6) National Center for Chronic Disease Control: Cancer control program. Information summary on the vaginal irrigation method in cervical cancer detection. Washington, D.C., Feb. 15, 1968.

(7) Mattingly, R. F., Boyd, A., and Frable, W. J.: The vaginal irrigation smear: a positive method of cervical cancer control. Obstet Gynec 29: 463–470, April 1967.

(8) Davis, H. J., and Jones, H. W.: Cervical cancer control with irrigation smears. Paper given at the Third International Congress of Cytology, Rio de Janeiro, Brazil, May 21, 1968.

# Education Notes

**Program for Master of Public Administration Degree.** The Institute of Public Policy Studies of the University of Michigan is offering a 2-year program leading to a master of public administration degree.

The curriculum is designed to train students for careers of broad scope and responsibility in public service. Emphasis is on a general, but analytic approach to policy formation and decision making in the public sector.

Requirements for the degree are 48 hours of graduate work, including four 2-term required courses with a summer's work-study experience in between.

Applicants must have a bachelor's degree from an accredited college or university. Special instruction, prior to the start of the fall term, is available for those with deficiencies in mathematics.

Various forms of financial aid are available.

Additional information is available from the Director, Institute of Policy Studies, 1516 Rackham Building, University of Michigan, Ann Arbor 48104.

**Public Health Traineeships.** The University of Southern California has a limited number of Public Health Service traineeships available for persons interested in working for a master's degree in public administration. The areas of concentration are health services administration and comprehensive health planning.

Both programs require 2 full years for completion and will prepare professionals in local, State, and Federal official and voluntary health and welfare agencies. The health services administration program will prepare persons to assume positions as administrators and executives. The comprehensive health planning program will develop skills in the planning process, a knowledge of the health field, and competencies in cooperative solution of health problems.

The traineeships will pay a minimum of $200 per month plus tuition and $41 per month for each dependent. Additional amounts are paid depending on prior related experience and education.

An undergraduate major in engineering, business, or physical, biological, or social sciences is acceptable as preprofessional background, provided the applicant has had at least 12 semester hours of undergraduate course work in economics, political science, human geography, psychology, cultural anthropology, or sociology, not more than 8 hours of which may be in any one field and at least one course in statistics.

Persons interested in enrolling for the fall 1969 semester may obtain additional information from Dr. Alexander Cloner, School of Public Administration, University of Southern California, Los Angeles, Calif. 90007.

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The program offers a select group of experienced health service administrators and planners a course dealing with health care policy, comprehensive health planning, and administrative developments.

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For further information write to the Sloan Institute of Hospital Administration, Graduate School of Business and Public Administration, 315 Malot Hall, Cornell University, Ithaca, N.Y. 14850.

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For further information write to the Sloan Institute of Hospital Administration, Graduate School of Business and Public Administration, 315 Malott Hall, Cornell University, Ithaca, N.Y. 14850.

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