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Cervical Cancer Screening in an Urban Emergency Room

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ABSTRACT

High risk groups for cervical cancer include women who are black, of low income, and who have sexually transmitted disease. These women must be targeted by cytologic screening programs if cervical cancer mortality is to be reduced by half by the year 2000, as proposed by the US Public Health Service's Objectives for the Nation. Urban emergency departments (EDs) often serve as the only provider of care for low income, minority women and are frequent sites of treatment for sexually transmitted disease. Most urban EDs are not used as sites for cervical cancer screening. Our study had two main goals: 1) to assess the feasibility of performing routine screening Pap smears in an urban emergency department, including both quality of Pap smears obtained and adequacy of follow-up; and 2) to estimate the prevalence of histologically-confirmed dysplasia among women receiving pelvic exams in the ED. We also attempted to evaluate the efficacy of referral of ED patients for Pap screening at a later date by a nurse practitioner. During 4 months of Pap screening in the ED, 706 Pap smears were performed in a population which was 70% black, 13% white, 11% Latina, and 4% Asian. The prevalence of dysplasia on initial Pap screening was 8%. 82% of patients with dysplasia on initial Pap returned for repeat Pap or biopsy, with dysplasia found in 67% of those 24 who were biopsied. Benign atypia was noted in 9% of screening Paps. Two cases of invasive cervical cancer were found at stages 1 and 2. The technical quality of Pap smears was excellent, with 2% of Paps rejected as unsatisfactory, and endocervical cells present in 73% of all Paps. Compliance of ED physicians

was significantly better when performing a Pap at the time of pelvic exam than when referring patients for a Pap at a later date. Only 27% of patients thus referred kept appointments. These findings indicate that routine Pap screening in urban emergency departments can be an important component of cervical cancer control programs.

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INTRODUCTION

Efforts to achieve the US Public Health Service stated goal of halving cervical cancer mortality by the year 2000 through Pap screening should target populations at high risk of developing the disease. Groups at high risk include racial minorities, the poor, and those at risk for sexually transmitted disease.

Black women are more than twice as likely to die from cervical cancer as are white women (Office of Surveillance and Analysis and Cancer Prevention and Control, 1990). Although rates of cervical cancer incidence and mortality have slowly declined for both whites and blacks over the past three decades, racial disparity persists.

Low income women have long been at higher risk for development of cervical cancer compared to more affluent groups. They are less likely to receive screening, and when diagnosed, often have a more advanced stage of disease with correspondingly higher mortality.

Evidence that cervical cancer is associated with sexual activity - specifically, with sexually transmitted infection by human papilloma virus - indicates the need to target groups with high rates of sexually transmitted disease. Rates of unprotected sexual activity associated with crack cocaine use are rising, as are rates of sexually transmitted disease in urban minority populations.

Black and low income women are more likely to be without regular providers of medical care than white women with higher incomes, and frequently depend on emergency departments for treatment of acute medical

illness. Emergency departments are also often the site where treatment is sought for sexually transmitted disease in urban areas. Screening for cervical cancer is not routinely done at these sites.

This paper details the justification, methods, and results of a study undertaken to determine the feasibility of screening for cervical cancer when pelvic examinations are done in an urban emergency department.

The Highland Hospital Pap Study was a collaborative effort involving the Primary Care Division of Internal Medicine, the Emergency Department, and the Obstetrics and Gynecology Service. It was supported by the National Cancer Institute Grant R03 CA45365-01. My particular contribution to the study included primary responsibility for review of the relevant literature, data entry, and data analysis.

CHAPTER 1: CERVICAL CANCER SCREENING IN VULNERABLE POPULATIONS

1.1 Cervical Cancer Incidence and Mortality

An estimated 13,500 new cases of cervical cancer will be diagnosed in the US in 1990, and approximately 6000 women will die from the disease (Silverberg et al., 1990).

Survival from cervical cancer is largely dependent on stage at diagnosis. Carcinoma in situ has a virtual 100% five-year survival, whereas stage 1 invasive cancer has a five-year survival rate of 80%, which drops to approximately 30% with stages 2 and 3. Stage 4 is associated with a 0 to 15% five-year survival rate (Mandelblatt, 1989).

1.2 Efficacy of Pap screening

Interventions to reduce mortality from cervical cancer have focused on early diagnosis and treatment through cervical cytologic screening (Pap smear). Evaluation of the Pap test is complicated because no randomized controlled trials were conducted when the test was initially introduced, and to conduct one now would be considered unethical (Eddy, 1981). Instead, evidence for the effectiveness of Pap screening comes primarily from two sources: research on the natural history of cervical neoplasia, and epidemiologic studies, which include comparative population surveys and case-control designs.

a) Natural History

It is generally accepted that cervical cancer is the end stage of a continuum of progressively more atypical cellular changes, ranging from dysplasia to carcinoma in situ to invasive cancer (Brinton & Fraumeni, 1986; Robbins et al., 1984). The earliest change is in the appearance of dysplastic, or malignant-appearing cells, in the basal layers of the epithelium. This precancerous state is also termed cervical intraepithelial neoplasia (CIN). Dysplasia/CIN is further subdivided, depending on the proportion of the thickness of squamous epithelium involved by dysplastic cells. CIN Grade 1 represents less than one-third involvement of the thickness of the epithelium by atypical cells (mild dysplasia); Grade 2, one to two-thirds involvement (moderate dysplasia); and Grade 3, two-thirds to full epithelial thickness involvement (severe dysplasia or carcinoma in situ) (Robbins et al., 1984).

Although a proportion of cases of mild dysplasia may spontaneously regress, there is strong evidence that dysplastic lesions tend to progress in severity over time. These findings come from studies in which women who failed to receive treatment for several years following abnormal Pap results were traced and re-examined (Kinlen & Spriggs, 1978; Koss et al., 1963). Kinlen and Spriggs found that after a mean interval of 5.2 years, among 60 women with abnormal (dysplasia or carcinoma in situ) Pap smears traced, 13 (22%) were found to have invasive carcinoma on repeat pap or biopsy; 20 (33%) showed persistent dysplasia or carcinoma in situ; and 19 (32%) had no abnormalities on repeat Pap or biopsy. Of the 13 women with invasive cancer, 5 died from the disease. In 1984, Stenkivist et al. traced Swedish women with untreated cytological abnormalities and found invasive

cervical cancer in 34% on re-examination within 11 years of the original Pap.

In an earlier study, Koss et al. (1963) examined the outcomes of dysplasia and carcinoma in situ independently. Three years after the finding of dysplasia on a Pap smear, 3.8% of cases had become invasive cancer; 42.3% had progressed to carcinoma in situ; 15.4% had persisted; and 38.5% of cases had regressed. Among cases of carcinoma in situ, 5.9% resulted in invasive carcinoma during the 3 year period; 7.5% had progressed to questionable invasion; 61.2% had persisted; and 25.4% had regressed.

These results demonstrate that while a proportion of dysplastic lesions may spontaneously regress, there is a significant risk of progression from all stages of cervical neoplastic lesions to invasive carcinoma, which is associated with significant mortality. As nearly 100% of women receiving treatment following diagnosis of carcinoma in situ survive greater than 5 years, early diagnosis through Pap screening should be expected to reduce mortality from cervical cancer.

b) Population Surveys and Case-Control Studies

Evaluation of the efficacy of screening for cervical cancer has largely been based on comparison of incidence and mortality rates between populations with different intensities of screening. These comparisons have been made between countries or counties during a specific time period, or within the same population at different points in time (Day, 1984). Recently, case-control designs have also been used to examine the effect of Pap screening and risk of cervical cancer.

A comprehensive cervical cancer screening program begun in Iceland in 1964 succeeded in screening 84% of the target group (women ages 25-59) (Johannesson et al., 1978). After 1970, a two-fold decrease in cervical cancer mortality was observed among the targeted age group ($p < 0.002$), while there remained little change in cervical cancer mortality for those ages 60 and older. Since mass screening began in Finland in the early 1970s, a 60-70% reduction in the national incidence and mortality from cervical cancer has been observed (Hakama & Louhivuori, 1988). In contrast, the Swiss canton of Vaud, where cervical cancer screening, though widely performed, is not conducted in an organized program, has experienced a 40% reduction in age-adjusted cervical cancer incidence between 1970-1985 (Levi et al., 1989).

In Denmark, county differences in screening strategies allowed investigators to compare the effects of organized screening programs vs spontaneous screening practices on cervical cancer incidence and mortality (Lynge et al., 1989). Their study revealed a significant effect of organized screening efforts in reducing both incidence ($RR=0.67$; 95% CI, 0.61-0.73) and mortality ($RR=0.68$; 95% CI, 0.59-0.78) of cervical cancer from 5 years after introduction of an organized screening program.

A similar finding was described in Kentucky, where in 1956, a cervical cancer screening program was instituted in Jefferson County (Christopherson et al., 1970). Mortality due to cervical cancer dropped from 23.7/100,000 in 1953 to 10.8/100,000 in 1967 ($p=0.01$) in Jefferson County, while cervical cancer mortality rates outside the county remained unchanged over the same time period.

Evidence that in many regions, including North America, mortality

due to cervical cancer was diminishing before Pap screening was introduced has led some to question whether other factors, such as socioeconomic changes and increased availability of medical care, have been more important than cytologic screening in the reduction of cervical cancer mortality (Cramer, 1974; McCormick, 1989). Although mortality rates from cervical cancer were not falling in the Scandinavian countries before screening was introduced, population comparisons remain vulnerable to this criticism (Day, 1984).

Attempting to separate the effect of cervical cytology screening from changes in socioeconomic factors, a Canadian group examined national mortality data at province and county levels, with respect to screening activity and indices of SES (Miller et al., 1976). Between 1960-1970, the 1966 provincial screening rate was significantly correlated with the percentage decrease in mortality rates from all uterine cancers ($p < 0.05$). This relationship persisted when changes in income and education were controlled.

In addition to these descriptive studies, several controlled studies provide evidence for the efficacy of Pap screening. In a case-control study in Ontario, Canada, Clarke and Anderson (1979) found a relative risk of invasive cancer of 2.7 (95% CI, 2.0-3.7) in women who had never received a Pap test, compared with women who had. Their case group consisted of 212 newly diagnosed cases of invasive cancer; the control group was comprised of 5 aged-matched neighborhood controls per case. The differences in Pap smear history between cases and controls persisted after adjustment for age, income, education, smoking, marital status, employment, and access to

medical care.

A 1984 case-control study conducted in Milan, Italy, compared the Pap screening histories of 145 women with CIN with those of 145 age-matched controls, and the Pap histories of 191 women diagnosed with invasive cervical cancer with those of 191 age-matched hospital controls (La Vecchia et al., 1984). Compared with women with no previous screening Pap, the relative risk for CIN was 0.27 (95% CI, 0.1-0.7) for those who had had one prior Pap and 0.12 (95% CI, 0.06-0.25) for women having had two or more prior Paps. The corresponding relative risks for invasive cervical cancer were 0.44 (95% CI, 0.24-0.80) and 0.20 (95% CI, 0.13-0.32). The relative risks for both CIN and invasive cancer increased with length of time interval since last Pap: from 0.07 at less than 3 years to 0.45 at more than 5 years for CIN, and from 0.10 to 0.36 for invasive carcinoma. These results remained significant after adjustment for SES, age at first intercourse, smoking, and educational level.

In a case-control study conducted in Scotland, researchers investigated the relative risk for invasive cervical cancer in each year subsequent to a negative Pap smear (MacGregor, et al., 1985). Cases included 115 women who had been diagnosed with invasive cervical cancer in the period 1968-1982, who had also been screened at least once for cervical cancer prior to diagnosis. Controls consisted of 5 age-matched women per case, who also had received at least one Pap, prior to the diagnosis date of the case. Results showed that the relative protection associated with having had a negative Pap decreased progressively with increasing time since last negative Pap, from 8.9 (95% CI, 1.8-44.4) after 12-23 months to 1.9 (95% CI, 0.4-4.5)

after 48-71 months. Although the confidence limits are wide, the trend was significant at $p < 0.0001$. The authors also report an apparent relative risk of 3 associated with no history of a negative smear, compared with having had at least one 10 years prior to diagnosis.

When the results of the above case-control studies, along with an additional study (published in French, not reviewed) are pooled, the relative risks of invasive cervical cancer associated with number of previous screening Paps are as follows: 1, $RR=0.42$ (95% CI, 0.27-0.64); ≥ 1 , $RR=0.32$ (95% CI, 0.26-0.40); ≥ 2 , $RR=0.2$ (95% CI, 0.15-0.28) (La Vecchia et al., 1987).

Several organizations have issued guidelines for cervical cancer screening, based on the evidence for its efficacy. Current recommendations for cervical cancer screening published by the American Cancer Society are that all women who have reached age 18 years, or who have been sexually active at a younger age, receive an annual Pap test and pelvic examination until three or more consecutive satisfactory normal annual exams have been obtained. After that, the Pap test may be performed less frequently at the discretion of the physician (Fink, 1988).

1.3 Cervical cancer as a sexually transmitted disease

The association between cervical cancer and sexual behavior has long been recognized. From early observational studies noting decreased incidence of cervical cancer among nuns (Fraumeni, et al., 1969), to multiple case control studies demonstrating increased risk of cervical cancer associated with greater number of sexual partners and younger age at first coitus (Slattery et al., 1989; La Vecchia et al., 1986; Clarke & Anderson,

1979), epidemiologic data supports the hypothesis that cervical cancer is a sexually transmitted disease. Numerous studies involving the etiologic role of various sexually transmitted infectious agents in cervical cancer, particularly viruses, have been reviewed recently (Fengoglio & Ferenczy, 1982; Brinton & Fraumeni, 1986; Mandelblatt, 1989).

Of all infectious agents studied, evidence for the role of human papilloma virus (HPV) in the etiology of cervical neoplasia is the strongest. Pathologic studies of HPV antigens and DNA in lesions of cervical cancer have shown highest correlation with HPV types 16 and 18 (Brinton & Fraumeni, 1986; Grubb, 1986; Schmauz, et al., 1989; Reeves et al., 1989). Evidence for the role of herpes simplex virus and cytomegalovirus in the etiology of cervical neoplasia is less well accepted (Brinton & Fraumeni, 1986).

The association between cervical neoplasia and sexually transmitted disease (STD) has important implications. Rates of STDs in urban minority populations have been increasing, particularly among blacks. This may be in part related to crack cocaine use and consequent high risk sexual behavior (Fullilove et al., 1990). Without an effort to increase cervical cancer screening in urban minority women, a rise in cervical cancer incidence and mortality can be expected.

1.4 Differential rates of cervical cancer incidence, survival, and mortality by race and socioeconomic status.

a) Race

Although substantial decreases in both incidence and mortality from

cancer of the uterine cervix have occurred during the past 30 years, rates among black women remain considerably higher than those among white women (Figure 1). National incidence and mortality data obtained from the Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute and from the National Center for Health Statistics for the period from 1969-1981 show the average annual age-adjusted incidence rates of invasive cervical cancer per 100,000 for 1978-81 were 20.2 for black women vs 8.8 for white women; mortality rates were 9.9 for blacks vs 2.8 for whites. For both blacks and whites, this represents a 40% decrease in incidence and a 45% decrease in mortality compared with the 1969-71 period. Blacks had a 2% to 17% poorer survival rate than whites for cases of localized cancer of the cervix during the period 1977-1981 (Bang et al., 1988). For the period 1980-1985, the relative five-year survival rate following the diagnosis of invasive cervical cancer was 59% for blacks, compared with 67% for whites (Silverberg et al., 1990).

For the San Francisco Bay Area, annual cervical cancer incidence from 1978-1981 for 20-24 year old black women was 4.8 per 100,000 vs 2.2 per 100,000 for 20-24 year old white women (SEER Program, 1984). The significant national black-white difference in cervical cancer five-year survival rates is not present in the San Francisco-Oakland SEER data area during the period of 1974-1985 (Ragland, 1988). Of the 2,090 cervical cancers diagnosed in women less than 70 years old, 430 (20.6%) were late diagnoses (localized, regional, or remote tumors) (Saunders, 1989). Japanese and Filipina women, along with women of all ethnic groups ages 60-69, were at greater risk for late diagnosis. The risk for late diagnosis associated with

Japanese ethnicity compared with white, non-hispanic women is estimated with an odds ratio of 2.65 (95% CI, 1.21-5.83); that for Filipina women is an odds ratio of 2.17 (95% confidence interval, 1.30-3.62) (Saunders, 1989).

In an earlier study in Alameda County, Breslow et al. noted a disproportionate incidence of, and mortality from, cervical cancer among blacks, relative to the general female population of the county (Breslow et al., 1964).

b) Socioeconomic Status

The association between low socioeconomic levels and higher rates of cancer morbidity and mortality, in general, has been well documented (Lipworth et al., 1969; Berg et al., 1977; Kaplan et al., 1984; Haan et al., 1987). Increased incidence and decreased survival from cervical cancer, in particular, have also been consistently linked with low socioeconomic status (SES). In an early study conducted in Louisville and Jefferson County, Kentucky, Lundin et al. (1965) noted that for the years 1953-62, annual age-adjusted incidence rates of cervical cancer were inversely related to socioeconomic status, based on census tract information. Rates ranged from a high of 62.6 per 100,000 in the lowest income area to 25.1 per 100,000 in the highest income area, with a downward gradient apparent in the two intermediate income areas. This trend persisted when women with cervical cancer were evaluated separately by race; however, the small numbers of black women in upper income areas made comparison difficult. The authors concluded that white females living in the lowest income area had age-adjusted annual incidence rates of cervical cancer which were similar to the

overall rate observed for non-whites (59.6 vs 58.1 per 100,000).

Davesa and Diamond (1980), using data from the 1969-71 Third National Cancer Survey (TNCS), showed that the incidence of cervical cancer had strong negative associations with income and educational levels among both the 3802 cases in white women and the 954 cases in black women studied. For the San Francisco-Oakland area, age adjusted incidence rates among white women with a 1969 income level of <\$9000 were 25.6 per 100,000 vs 7.5 per 100,000 for white women with an income of >14,999 ($p < 0.001$). Black women experienced a much narrower income range, and although there was a lower incidence of cervical cancer among women in the highest income bracket (>\$6999), the difference was not as marked as that for whites. For black women with a 1969 annual income of <\$5000, age-adjusted incidence of cervical cancer was 25.4 per 100,000; for income \$5000-6999, 29.6; and for income >\$6999, 18.9 ($p < 0.05$). Age-area-income adjusted relative risk for cervical cancer for blacks relative to whites was 1.27.

Using a case-control design, Fasal and co-workers found poverty to be associated with an increased risk for cervical neoplasia (Fasal et al., 1981). The case group consisted of 166 women with biopsy-proven cervical neoplasia who had been screened by the California Cervical Cancer Screening Program (a screening program conducted in 12 California counties from 1975-1979). A random sample of 2771 women having had normal Pap results comprised the control group. The relative risks associated with low SES for dysplasia and for cervical cancer are 1.75 ($p \leq 0.05$) and 2.12 ($p \leq 0.05$), respectively. Among this group of women who had received Pap screening,

racial minorities were not found to be at higher risk for cervical neoplasia.

In a study published in 1969, Lipworth et al. examined the relative survival rates of two socioeconomic groups of Boston cancer patients registered in the years 1957-1963. Women diagnosed with cervical cancer from census tracts having a median income of >\$5000 had higher relative survival rates at 1 year and at 3 years than cervical cancer patients with incomes <\$5000 (83.8% vs 73.3% and 70.5% vs 54.9%, respectively). Both groups were treated at the same facility. The authors report that while 44.7% of cervical cancer cases were localized at diagnosis among women of the higher income census tracts, only 34.7% of cases were localized at diagnosis among women of lower income census areas.

In an almost entirely all white population in Iowa, Berg et al. (1977) found similar correlation between socioeconomic status and stage at diagnosis of cervical cancer, with localized disease in 28% of indigent cervical cancer patients vs 41% of non-indigent patients diagnosed between 1940-1969.

A review of the California Tumor Registry from 1942-56 comparing cervical cancer mortality in private vs county hospitals found later stage at diagnosis and a corresponding decreased survival among county hospital patients (California Tumor Registry, 1963). Among county hospital patients, 30% of cervical cancers were localized at diagnosis compared with 64% localized in private hospital patients. The 5-year survival of county hospital patients was 39%, vs 62.5% for private hospital patients.

While the risks associated with SES and ethnicity are inter-related and are difficult to separate, much of the scientific literature to date supports the

hypothesis that racial differences in cervical cancer incidence and mortality are largely due to socioeconomic status and the overrepresentation of blacks in the lower socioeconomic levels (Baquet & Ringen, 1986). When adjustment is made for population differences in socioeconomic distribution, the excess risk of cervical cancer among blacks is reduced from more than 70% to less than 30% (Davesa & Diamond, 1980).

1.5 Who is being screened for cervical cancer?

While epidemiologic studies of cancer of the cervix continue to show an increased risk of the disease among low income groups and non-whites, multiple studies demonstrate that those at high risk are the least likely to obtain Pap screening (Warnecke & Graham, 1976; Fruchter et al., 1980; Kleinman & Kopstein, 1981; Hayward et al., 1988; Makuc et al., 1989). Data from the 1973 National Health Interview Survey (NHIS) indicates that the proportion of women who report never having had a Pap smear is greater among blacks, the poor, the elderly, and nonmetropolitan residents (Kleinman & Kopstein, 1981). Over 25% of poor black women aged 25-44 living in nonmetropolitan areas report never having had a Pap compared to 6% of 25-44 year old white women, who are not poor. Increased relative risks for never having had a Pap were also associated with low income at each age level among women of the same race.

In a 1986 US population survey, Hayward and co-workers obtained similar results concerning the relationship between income and having received cervical cancer screening (Hayward et al., 1988). 72% of women with household incomes $\leq$ 150% of poverty level reported having had a Pap

smear within the previous 3-5 year period compared to 83% of women with higher household incomes ($p < 0.001$). Additionally, the absence of health insurance was associated with failure to obtain Pap screening (OR for Pap within prior 3-5 years among women with no health insurance = 0.47; 95% CI, 0.34-0.66). Black ethnicity, however, was not found to be a risk factor associated with failure to receive appropriate Pap screening.

Of particular importance are two studies showing that, while low-income women are less likely to receive preventive screening, most of the women without recent cervical screening had had a recent physician contact (Fruchter et al., 1980; Makuc et al., 1989). Among new cases of cervical cancer diagnosed in Brooklyn between 1976-1978, 52% of cases arose in women who had never had a Pap and 62% arose in women who had not had a Pap within 5 years. In the previous 5 years, 73% of the unscreened women had received outpatient medical care and 16% had been hospitalized (Fruchter et al., 1980).

1.6 Pap Screening in Emergency Departments and STD Clinics

The above findings indicate that many of the low-income, unscreened population could be reached through screening in existing health care delivery systems; yet few examples exist in the US of the utilization of alternative sites for Pap screening. In 1968, New York passed legislation mandating that all hospitalized females, ages 21 and older, be offered a Pap test, unless the medical record shows a normal result within the past 3 years (Marcus et al., 1990).

Emergency departments serve as the only provider of care for many

women in low income and minority communities (Strauss et al., 1983), and thus represent an important potential site for intervention in outpatient populations at high risk for cervical cancer. A recent survey of STD clinics and hospital-based emergency centers in Los Angeles County demonstrates marked underutilization of these facilities for Pap screening (Marcus et al., 1990). Of the 19 emergency centers surveyed, 13 estimated that fewer than 5% of female patients treated for gynecologic complaints had received a Pap smear. Only 3 of the 11 STD clinics surveyed had a policy for Pap screening, and fewer than 5% of female patients seen at all STD clinics had received a Pap smear.

While Pap screening is routinely done in British STD clinics (British Co-operative Clinical Group, 1987; Tait et al., 1988), review of the US literature reveals only a single study in which Pap screening was performed in STD clinics (Briggs et al., 1980). This Seattle-based study found the rate of cervical neoplasia for STD patients to be five times that reported for the general population. Similarly, only a single report can be found in the current literature of an attempt to incorporate routine cervical cancer screening into an emergency department setting (Levine, 1988). The preliminary data from this small study showed that during a two month period, 33 women received Paps in an El Paso county hospital emergency room. Abnormal Pap results included one atypical smear and one CIN 1 Pap.

Arguments against cervical cancer screening in emergency departments include questions regarding the quality of Pap smears attainable, and the ability to follow-up abnormal smears. When inflammation

of the cervix from infection is present, the Pap smear can be abnormal due to inflammation (benign atypia), requiring a repeat procedure (Pap or colposcopy) to rule out dysplasia (Brown & Phillips, 1985; Jones et al., 1987; Wilson et al., 1990). High rates of such smears from an ED screening program could impose additional cost and unnecessary psychological trauma on patients who might better be screened in settings with lower likelihood of cervical inflammation. On the other hand, the presence of these same infections places the patient at higher risk for cervical cancer, and failure to obtain a sample during a speculum exam may result in a missed opportunity to detect cervical dysplasia or cancer.

Follow-up of ED patients is often difficult due to many factors, including the degree of transiency in the population, and overburdened outpatient facilities.

To test the feasibility of routine cervical cancer screening in urban emergency departments, and to estimate the prevalence of dysplasia in a high risk, minority emergency patient population, we undertook the following study of Pap screening in the ED at Highland General Hospital.

CHAPTER 2: THE STUDY SETTING AND DESIGN

Highland General Hospital (HGH), located at 1411 East 31st Street near 14th Avenue in East Oakland, is a 300-bed acute care facility which functions as the primary County Hospital serving East-Central Oakland, a federally designated Primary Care Health Manpower Shortage Area. Additionally, the emergency department at HGH is the primary ED for all medically indigent patients in Alameda County and is the designated trauma center for the northern part of the county.

While 27% of the population of Alameda county live in households earning less than 200% of federal poverty levels, 90% of HGH patients are below 200% of these poverty levels; virtually all (92%) of Highland's patients depend on some form of government assistance for their medical care. The majority of Highland patients are non-white. During the period of our study, January 1989-August 1989, the HGH emergency department saw over 5000 patients per month.

Selection of subjects:

ED Phase: During January/February and May/June 1989, Emergency Department physicians performed Pap smears, following informed consent, on 706 female patients seen in the emergency department (emergency room (ER) and acute care clinic (ACC)). Women who received a pelvic examination as part of the evaluation of their medical problem received a coincidental Pap smear. A verbal informed consent, including printed instructions given to the patient, was approved for use by the Alameda

County Human Subjects Committee. Women who were both younger than twenty years and not sexually active were excluded from the protocol.

Referral Phase: This arm of the study design attempted to evaluate the efficacy of referring ED patients for Pap screening. During March/April and July/August 1989, rather than performing Pap smears at the time of pelvic exam in the ED, emergency physicians scheduled patients (N=66) for Pap screening at another site, at a later date. The same criteria for exclusion used in the ED Phase was used in the Referral Phase.

Cytologic sampling technique: Pap smears from the cervical os were obtained using a cytobrush, and an exocervical scrape was obtained using a polypropylene cervical spatula (Polyscrape); both samples were applied to glass slides and fixed with an alcohol-based cytology fixative. For premenopausal women who were known to be pregnant or who had not had a menstrual period in the previous 8 weeks, a cotton tipped applicator was used instead of a cytobrush for endocervical sampling.

Instruction of emergency room physicians: A member of the research team instructed emergency department physicians in Pap smear technique through presentations at emergency room departmental conferences, a written handout, and follow-up proctoring of individual physicians.

Pathologic interpretation of Paps: All Paps done in the Emergency Department or by the study nurse practitioner were submitted to a private pathologist for interpretation. All cervical biopsies and follow-up Paps done

in the HGH gynecology clinic or operating room were read by the HGH pathology department.

Follow-up: One member of the study team was responsible for follow-up of all abnormal Pap smears. All Pap smears CIN 1 or greater were referred to the HGH gynecology clinic. These patients were further evaluated by repeat Pap smear, colposcopy, and/or biopsy, at the discretion of the gynecologist. Patients with benign atypia were referred to the study nurse practitioner for repeat Pap smear.

Patient phone numbers were obtained from hospital records, reverse phone directory, the Department of Motor Vehicles, and patient's family members and associates. Efforts to reach all patients by phone and mail were made, including the use of certified letters. Home visits were made where possible for patients not responding to the above.

Analysis: Patient information from emergency room records and pathologic reports was entered directly into a computerized database program (written by The Northern California Cancer Center using Paradox 3). Simple statistical tables were generated. Chi square and Fischer exact tests were calculated using the statistical program, EPISTAT.

CHAPTER 3: RESULTS

3.1 Characteristics of the population screened

A total of 706 PAPs were performed in the emergency department during the four months of the ED Phase of the study; 384 (54%) of these were done in the ER and 322 (46%) were done in the ACC.

Race: 493 (70%) women screened were black; 94 (13%) white; 78 (11%) latina; 29 (4%) Asian (including Chinese, Korean, Vietnamese, Cambodian, Filipina, Japanese, and Laotian); 4 (<1%) Native American; and 8 (1%) unknown (Figure 2).

Age: 78 patients (11%) were ages 10-19; 340 (48%) ages 20-29; 212 (30%) ages 30-39; 59 (8%) ages 40-49; 12 (2%) ages 50-59; 4 (<1%) ages 60 and older (Figure 3).

Insurance status: 301 (43%) patients were covered by Medi-Cal; 192 (27%) by County Medical Services Program (CMSP) for persons <200% poverty level; 3 (<1%) by CMSP for persons >200% poverty level; 13 (2%) by miscellaneous county programs (including jail, mental health, and victim of crime); 4 (1%) by Medicare; 9 (1%) by private insurance; and for 183 (26%), insurance status was not available.

Comparison of demographics (age, race, and insurance status) of the two ED study periods (January/February and May/June, 1989) shows that these two groups are not significantly different. Therefore, they were grouped for the remainder of this analysis.

Patient reports of time since last Pap: These were supplied on 603 (85%) of the screening records. 224 (37%) women stated that the time since last Pap was less than 1 year; 132 (22%) between 1 and 2 years; 28 (5%) between 2 and 3 years; 43 (7%) greater than 3 years; 176 (29%) did not know; and 103 (15%) were not reported.

Disposition from ED: Of the women screened in the ER or ACC, 68 (10%) were admitted to in-patient services, while the remainder was discharged home.

STD's: Emergency department clinical encounter records were available for 668 (95%) of the women screened. Pelvic inflammatory disease (PID) was included in the discharge diagnosis of 133 (20%) subjects. Purulent discharge from the cervical os was described as present in 56 (8%) cases; as absent in 266 (40%); and was not noted in 384 (54%). Gonorrhea culture results were obtained on 588 (83%) patients, and were positive in 73 (12%) cases. Culture results for Chlamydia were obtained for 497 (70%) women screened, and were positive in 38 (8%). Trichomonas was noted on ED physical exam in 77 (11%) women and was reported absent in 266 (38%). Candida was seen in 50 (7%) women, and reported absent in 242 (34%).

3.2 Quality of Paps obtained

Technique: In 614 cases, the record stated whether or not a cytobrush had been used. Of these, a cytobrush was used in 490 (80%); in 124 (20%),

a cytobrush was not used.

Pathological examination revealed 512 (73%) Paps with endocervical cells present; in 194 (27%), endocervical cells were absent or not specified. Of the 490 cases in which a cytobrush was used, 405 (83%) showed endocervical cells. Of the 124 cases where a cytobrush was not used, 49 smears (40%) had endocervical cells present.

Drying artifact was noted in 92 (13%) Paps. Red blood cells were present in 148 (21%) Paps. Atrophic cells were present in 5 (<1%) Paps. Some degree of inflammation was noted in 78 Paps (11%).

13 Paps (2%) were described as unsatisfactory for pathologic interpretation.

Predictors of benign atypia: Benign atypia was noted in 62 (9%) Paps. When the cervical os was described as purulent, atypia was present in 8 (14%) paps; when this was absent, 15 (5%) of paps showed benign atypia ($p=0.01$). When PID was included in the discharge diagnosis, benign atypia was noted in 18 (14%); when PID was not suspected, benign atypia was present in 39 (7%) ($p=0.02$). When gonorrhea cultures were positive, benign atypia was present in 11 (15%); when GC cultures were negative, benign atypia was noted in 40 (8%) ($p=0.04$). With positive tests for chlamydia, benign atypia was present in 2 (5%); with negative results, benign atypia was present in 38 (8%) (this difference was not statistically significant). When trichomonas was present, benign atypia was noted in 11 (14%) smears; when trichomonas was absent, benign atypia was noted in 21 (8%) ($p=0.08$). When candida was described, benign atypia was present in 2 (4%);

when not noted, it was present in 20 (8%) Pap smears (this difference was not statistically significant).

The presence of endocervical cells on a Pap smear was associated with a higher rate of benign atypia: 53 (10%) smears showed benign atypia when endocervical cells were present compared to 9 (5%) smears with absent endocervical cells ($p=0.01$).

Predictors of dysplasia: The finding of purulent cervical discharge on pelvic exam is associated with a higher rate of dysplasia. Six (11%) women with cervical discharge had Pap smears showing CIN 1 or greater, while 11 (4%) women without purulent cervical discharge had similar dysplastic Pap smears ($p=0.02$). There were no significant differences in rates of CIN 1 or greater based on the variables of suspected PID, GC cultures, chlamydia tests, and presence of candida or trichomonis on exam.

The presence of endocervical cells on the Pap smear was associated with a higher rate of dysplasia. Of the 512 Paps smears in which endocervical cells were present, 46 (9%) were interpreted as CIN 1 or greater; of those 194 smears which lacked endocervical cells, 9 (5%) were read as CIN 1 or greater ($p=0.05$).

Occult infections detected by Pap smears: When trichomonas was noted to be present in the ED exam ($N=77$), it was also noted on the Pap in 38 cases (49%). When trichomonas was either not commented on or said to be absent in the ED exam ($N=529$), it was noted on 59 Paps smears (11%). When trichomonas was specifically noted to be absent in the ED exam

(N=246), it was present in 18 Paps smears (7%).

When yeast was described in the ED exam (N=50), it was also noted on the Pap smear in 7 cases (14%). When presence of yeast was either not commented on or said to be absent in the ED exam (N=607), it was noted in 9 Paps (2%). When yeast was specifically noted to be absent in the ED exam (N=242), it was present on two Paps smears (<1%).

3.3 Prevalence of dysplasia

Of 706 Paps, 55 (8%) showed some degree of dysplasia or carcinoma (Figure 4). 43 (6%) showed CIN 1 (mild dysplasia); 9 (1%) CIN 2 (moderate dysplasia); 2 showed CIN 3 (severe dysplasia/ carcinoma in situ); and 1 showed invasive carcinoma. 576 (82%) Paps were normal (class 1). Of Paps read as normal, 71% had endocervical cells present.

Pap results stratified by age, race, and insurance status are shown in Tables 1, 2, and 3:

Table 1. Pap Results by Age.

	<20	20-29	30-39	40+
Unsatisfactory	2 (3%)	3 (1%)	7 (3%)	1 (1%)
Benign	62 (68%)	276 (81%)	171 (81%)	66 (88%)
Atypia	4 (5%)	31 (9%)	23 (11%)	4 (5%)
CIN 1	8 (10%)	24 (7%)	8 (4%)	3 (4%)
CIN 2	1 (1%)	6 (2%)	2 (<1%)	0
CIN 3	1 (1%)	0	1 (<1%)	0
Inv Ca	0	0	0	1 (1%)
<u>CIN 1 or greater</u>	<u>10 (13%)</u>	<u>30 (9%)</u>	<u>11 (5%)</u>	<u>4 (5%)</u>
Total	80	340	212	75

(χ^2 for trend =4.86, p=0.03)

Table 2. Pap Results by Race.

	Black	White	Latina	Asian
Unsatisfactory	7 (1%)	4 (4%)	1 (1%)	1 (5%)
Benign	402 (82%)	77 (82%)	66 (85%)	20 (69%)
Atypia	42 (9%)	10 (11%)	3 (4%)	6 (21%)
CIN 1	31 (6%)	3 (3%)	7 (9%)	2 (7%)
CIN 2	8 (2%)	0	1 (1%)	0
CIN 3	2 (<1%)	0	0	0
Inv Ca	1 (<1%)	0	0	0
<u>CIN 1 or greater</u>	<u>42 (9%)</u>	<u>3 (3%)</u>	<u>8 (10%)</u>	<u>2 (7%)</u>
Total	493	94	78	29

(Black-White and Latina-White differences in numbers of Pap smears CIN 1 or greater are significant at $p=0.05$)

Table 3. Pap Results by Insurance Status.*

	Private	Medi-Cal	CMSP			
			<200%	>200%	Misc.	Medicare
Unsatisfactory	0	8	0	0	2	0
Benign	8	252	154	3	7	2
Atypia	0	23	22	0	4	0
CIN 1	1	13	11	0	0	2
CIN 2	0	4	3	0	0	0
CIN 3	0	1	1	0	0	0
Inv Ca	0	0	1	0	0	0
<u>CIN 1 or greater</u>	<u>10</u>	<u>18</u>	<u>16</u>	<u>0</u>	<u>0</u>	<u>2</u>
Total	9	301	192	3	13	4

* Total number of patients for whom insurance status known = 522

For the 427 patients for whom it was known, Pap results stratified by patient reported time since last Pap are presented in Table 4:

Table 4. Pap results by reported time since last Pap.

	< 1 year	1-2 yrs	2-3 yrs	>3 yrs
Unsatisfactory	5 (2%)	2 (2%)	0	1 (2%)
Benign	185 (83%)	108 (82%)	24 (86%)	38 (88%)
Atypia	13 (6%)	11 (8%)	3 (11%)	1 (2%)
CIN 1	15 (7%)	10 (8%)	1 (4%)	2 (5%)
CIN 2	4 (2%)	1 (<1%)	0	1 (2%)
CIN 3	1 (<1%)	0	0	0
Inv Ca	1 (<1%)	0	0	0
CIN 1 or greater	21 (9%)	11 (8%)	1 (4%)	3 (7%)
Total	224	132	28	43

Other HGH Screening Paps

During the study months of January/February and May/June of 1989, 1176 screening Pap smears were done in other outpatient clinics at Highland Hospital (primarily gynecology and general internal medicine clinics).

Atypia was present in 90 (8%); mild to moderate dysplasia (CIN 1-2) was seen in 19 (2%); severe dysplasia/carcinoma in situ in 4 (<1%); and 1 (<1%) invasive cancer was identified. (Note: the Pap smear classification scheme used by the HGH pathology department groups mild and moderate forms of dysplasia in one category, Class 2.)

Figure 5 illustrates a comparison of the rates of abnormal Paps obtained in HGH clinics and those obtained through the ED screening.

3.4 Follow-up of abnormal Paps

Follow-up rates by Pap smear type: 82 (70%) of the 117 emergency

department patients with abnormal Paps returned for follow-up care. Of the 62 patients with initial Paps showing benign atypia, 37 (60%) returned for a follow-up visit. Of the 55 patients with CIN 1 or greater on initial Pap, 45 (82%) returned for a follow-up visit. Of the 12 patients with CIN 2 or greater initially, all returned for follow-up.

Follow-up results of atypical Pap smears: Of the 37 patients with benign atypia on initial Pap who returned for follow-up, eight (22%) had colposcopy; 6 (16%) were biopsied; and 31 (84%) received repeat Pap without biopsy. Of the 31 who received Pap without biopsy, repeat Paps were normal in 21. An additional three were normal after several repeat Paps. Six patients continued to show benign atypia on subsequent Paps; 1 showed CIN 1 which was not confirmed by repeat Pap or biopsy. Of the 6 biopsies: 1 showed normal cytology; 1 showed benign atypia; 2 had CIN 1; 1 had CIN 2; and 1 had invasive cervical cancer. This was a stage 2 cancer confined to the cervix and vagina. Confirmed diagnosis (either by repeat Pap or biopsy), summarized in Figure 6, are as follows: 25 (68%) normal cervix; 7 (19%) benign atypia; 2 (5%) CIN 1; 1 (3%) CIN 2; and 1 (3%) invasive cancer.

Follow-up results of Paps smears showing CIN 1 or greater: Of the 45 patients with CIN 1 or greater on initial Pap smear who returned for follow-up, colposcopy was performed on 36 (80%). 24 (53%) were biopsied, 12 (27%) received a repeat Pap with colposcopy, and 9 (20%) received a repeat Pap only. Of the 21 repeat Paps, 1 (5%) was unsatisfactory; 7 (33%)

were normal; 5 (24%) showed benign atypia; 5 (24%) showed CIN 1; and 3 (14%) showed CIN 2. Of the 24 biopsy results, 9 (38%) showed atypia; 5 (21%) were CIN 1; 4 (19%) were CIN 2; 5 (21%) were CIN 3; and 1 (4%) showed invasive cancer. 16 (67%) showed CIN 1 or greater. A summary of the diagnoses confirmed by repeat Pap or biopsy is as follows (Figure 7): 7 (16%) normal; 14 (31%) benign atypia; 10 (22%) CIN 1; 7 (16%) CIN 2; 5 (11%) CIN 3; and 1 (2%) invasive cancer. Follow-up results of each of these individual categories are presented below.

a) Follow-up results for CIN 1 Paps: Of the 43 emergency room patients with initial CIN 1 Paps, 33 returned for follow-up. 26 (60%) received colposcopy, of whom 16 were biopsied. 17 (39%) women received a repeat Pap, but no biopsy. Of the 17 patients receiving repeat Pap only, 7 (41%) were benign; 4 (23%) showed benign atypia; 4 (23%) showed CIN 1; and 2 (12%) showed CIN 2. Of the 16 patients with biopsies, 7 (44%) showed benign atypia; 3 (19%) showed CIN 1; 2 (12%) showed CIN 2; and 4 (25%) showed CIN 3; 9 (56%) showed CIN 1 or greater. In sum, a total of 15 (46%) patients with initial Paps of CIN 1 who returned for follow-up received a final diagnosis of CIN 1 or greater, either by repeat Pap or by biopsy.

b) Follow-up results for CIN 2 Paps: Of the 9 emergency room patients found to have CIN 2 on initial Pap, 8 (89%) received colposcopy, of whom 6 were biopsied; and 3 (33%) received repeat Pap without biopsy. The results of the 6 biopsies are as follows: 2 (33%) benign atypia; 2 (33%)

CIN 1; and 2 (33%) CIN 2. Of the 3 patients who received repeat Pap without biopsy, 1 was unsatisfactory; 1 showed benign atypia; 1 showed CIN 2. A total of 5 (55%) women with initial Pap of CIN 2 received a final diagnosis of CIN 2 or greater, either by repeat Pap or biopsy.

c) Follow-up results for CIN 3 Paps: Of the 2 patients with CIN 3 on initial Pap, one received colposcopy with biopsy, showing CIN 3. The other received a repeat Pap only, showing CIN 1.

d) Follow-up results for invasive cancer: The one patient with invasive cancer detected on initial Pap received colposcopy and biopsy, which confirmed the diagnosis. This was a stage 1 cancer, confined to the cervix.

Follow-up of unsatisfactory Paps smears: Of the 13 patients with initial Paps which were read as unsatisfactory, 3 returned for repeat Paps. 2 were read as benign, and 1 as CIN 1. The latter was followed at Kaiser Hospital.

Summary of Confirmed Dysplasia

Of the 706 patients screened in the emergency department, a total of 27 (4%) received a final diagnosis of CIN 1 or greater, confirmed by repeat Pap or biopsy, and 16 (2%) received a biopsy-proven diagnosis of CIN 1 or greater.

Follow-up efforts

Study personnel were able to contact patients directly via phone in 54

(46%) patients for whom follow-up was attempted. For those patients for whom phone contact was made, the average number of calls required to reach the patient was 3.3. It was possible to verify that the phone number listed in the emergency room record was correct in 67 cases (57%). For 72 patients (61%), study personnel verified that the address listed in the emergency room record was correct.

Home visits were attempted for 7 patients who had been refractory to previous follow-up efforts. Of these, 2 resulted in patient contact.

15 patients were contacted through pre-existing appointments at other Highland clinic sites.

3.5 PAP referral

Over the months March, April, July and August, 1989, 66 ED patients were given referral appointments for Pap smears with the study nurse practitioner. 18 women (27%) kept their appointments and were screened. Two (11%) of these women were referred from the emergency room and 16 (89%) were referred from the acute care clinic.

Five (28%) of these 18 women were ages 20-29; 9 (50%) were ages 30-39; 3 (17%) were ages 40-49; and 1 (5%) was age 60-69. 12 (67%) were black; 3 (17%) were Asian; 1 (5%) Latina; and 1 (5%) of unknown race. Regarding financial status, 9 (50%) were less than 200% of poverty level/county medical services; 1 (5%) was greater than 200% of poverty level/county medical services; 4 (22%) were covered by Medi-Cal; 4 (22%) were of unknown insurance status.

Pap smear results: 14 (77%) were normal; 3 (17%) showed benign

atypia; and 1 (5%) was CIN 1.

Follow-up: the patient with the CIN 1 Pap returned for follow-up and received colposcopy with biopsy, showing CIN 1.

2 of the patients with benign atypia had follow-up Paps which were normal, and 1 failed to return for follow-up.

CHAPTER 4: DISCUSSION

Our study had two main goals: 1) to determine the feasibility of performing routine Pap smears on patients receiving pelvic exams in an urban emergency department, both in terms of quality of Pap smear obtained and ability to follow-up patients with abnormal smears; and 2) to determine the prevalence of dysplasia in this high risk group on initial screening, and of histologically-confirmed dysplasia by repeat examination. We also attempted to evaluate the efficacy of referral of emergency department patients for Pap screening at a later date.

4.1 Prevalence of dysplasia and adequacy of follow-up

The 8% prevalence of dysplasia/carcinoma on initial screening of this emergency department population is significantly higher than the 2% found by screening in other Highland clinics. This prevalence figure is also 4 times higher than that which has been reported for the general California population (Fasal et al., 1981).

There is scant literature from similar patient populations with which to compare the results of our study. We are only aware of one previously published study which undertook routine Pap screening in the emergency room (Levine et al., 1988). This study found one dysplastic smear, and one atypical smear out of 33 women screened. Although Marcus et al. (1990) report that a comprehensive Pap screening program for gynecologic and prenatal emergency room patients is ongoing in a Los Angeles County supported hospital, no further data concerning this program has been

published.

Briggs et al. (1980) found a similarly high rate of dysplasia when screening 764 STD clinic patients in Seattle. Their reported prevalence of 11.4% dysplastic Paps is higher than that of 7.4% reported by British STD clinic-based screening programs (British Co-operative Clinical Group, 1987). Our review of the literature revealed no other published data from US STD clinic Pap screening programs.

Our 82% rate of follow-up and 44% rate of biopsy of dysplastic Paps compare favorably to other studies. In the Briggs study, 36% of STD patients with dysplastic Paps returned for follow-up and 21% were biopsied. In the California Cervical Cancer Screening Program (CCCSP) study of 34,318 screened women, 46% of 547 patients with Paps of CIN 1 or greater were biopsied (Fasal et al., 1981).

Our 67% rate of dysplasia among those biopsied is consistent with the 61% rate reported in STD clinic patients by Briggs and the 63% rate reported by the CCCSP.

We can estimate a minimum prevalence of histologically confirmed dysplasia in our population from the 82% of patients with dysplastic Paps who returned for follow-up. Assuming that all of the 18% of patients with dysplastic Paps who were lost to follow-up would have had negative findings if repeat Pap or biopsy had been done, a minimum prevalence of histologically confirmed dysplasia is 3.8%; and of biopsy-proven dysplasia, 2.3%. These minimum estimates are considerably higher than the 0.7% biopsy-proven rate of dysplasia found in the CCCSP study, which had similar rates of biopsy follow-up of abnormal Paps.

Latinas, blacks, and Asians had higher rates of cervical dysplasia on initial screening than whites (10%, 9%, and 7%, respectively, vs 3%); the differences between whites and blacks, and whites and Latinas are statistically significant ($p=0.05$). Women under 20 years of age had the highest rates of dysplasia (13%), and a trend for decreasing incidence with age was observed ($p=0.05$).

Surprisingly, rates of abnormal Pap smears showed no apparent correlation with patient report of time since last Pap. We believe from anecdotal reports that many women in our study may have confused prior pelvic exams with a Pap smear. A recent study of rural black women found that 20% did not accurately recall whether they had received a Pap smear within the previous 3 years (Sawyer et al., 1989). Other investigators have found unreliability of self-reporting of Pap history among urban black women (Warnecke & Graham, 1976). This illustrates the need for health care providers to inform women at the time of pelvic exam whether or not a Pap smear is being done. It also calls into question recently published studies citing a higher proportion of black women than white women of all ages reporting having been screened for cervical cancer (Office of Surveillance and Analysis and Cancer Prevention and Control, 1990). Physicians must be educated that self-report may not be a reliable criterion for patient exclusion from Pap screening.

4.2 Can Paps of good quality be obtained in an ED setting?

The technical quality of Pap smears obtained in our study was excellent. Most pathologists agree that adequate Pap smears must contain

endocervical cells from the squamocolumnar junction, as this is where most cervical dysplasia occurs (Koss, 1989; Reissman, 1988; Kivlahan & Ingram, 1986; Greening, 1985; Elias et al., 1983). Use of the cytobrush in cervical cytology sampling has recently been shown to increase the yield of endocervical cells (Boon et al., 1986; Reissman, 1988; Lavery et al., 1989). Use of the cytobrush in our study was associated with 83% of smears containing endocervical cells, compared to only 40% of smears when the cytobrush was not used. These rates are similar to those reported by Reissman (1988) in a study of 2478 gynecology and family practice clinic patients, with 40% retrieval of endocervical cells prior to introduction of the cytobrush and 61% following routine use of the device.

Benign atypia was noted in 9% of the ED Paps. Of those who returned for follow-up, 68% showed normal cytology after one or more repeat smears. It could be argued that the additional follow-up required for these potentially healthy women mitigates against routine Pap screening in the ED. This rate, however, is not significantly different from the 8% rate of benign atypia noted in other HGH clinic settings, and is well within the 13% range commonly accepted (Peters & Kershaw, 1988). Moreover, the presence of atypical cells may mask dysplasia (Wilson et al., 1990). Of particular importance are the 11% of our patients with initial Paps showing benign atypia who received a final follow-up diagnosis of CIN 1 or greater, including one patient with stage 2 invasive cervical cancer.

Factors observable at the time of pelvic exam in the ED which correlated with the presence of benign atypia on Pap smear were purulent discharge from the cervical os, and a diagnosis of PID. Positive cultures for

gonorrhea also correlated with benign atypia on Pap smear, but the results of these cultures are not available to the emergency room physician at the time of the pelvic exam. Trichomonas, candida, and positive chlamydia cultures were not significantly associated with benign atypia on Pap. We did not have sufficient numbers of patients who returned for follow-up after an initial Pap showing benign atypia to assess potential predictors of the cases of atypia which tend to be normal on follow-up vs those which manifest dysplasia or cancer on follow-up exam. Given the inability to determine which patients at time of initial exam may be at increased risk of dysplasia or cancer, and the overall acceptable rate of benign atypia found in our study, we do not recommend using the presence of purulent cervical discharge or a diagnosis of PID as exclusionary criteria for the performance of a Pap smear in the emergency department.

29% of Paps read as normal had no endocervical cells present. Interpretation of these Paps must be made with some caution. While one study of 18,914 smears found no association of cellular abnormalities with the presence of endocervical cells (Kivlahan & Ingram, 1986), a strong association has been documented by others (Elias et al., 1983). In our own series, the presence of endocervical cells was significantly associated with cellular abnormalities on Pap smear: 10% of smears showed benign atypia and 9% showed dysplasia when endocervical cells were present, compared to 5% atypia and 5% dysplasia in the absence of endocervical cells ($p=0.02$ and $p=0.05$, respectively). Thus, it is possible that the 18% rate of abnormal Paps observed in our study would increase if repeat Paps were performed on those patients whose initial Paps lacked endocervical cells.

The 2% overall rate of unsatisfactory Pap smears is well below the 5% commonly reported (Peters & Kershaw, 1988). Drying artifact, present in 13% of our Paps, could conceivably be reduced by further instruction of ED personnel regarding the importance of rapid specimen fixation.

One unexpected benefit of performing screening Paps in the ED was the diagnosis of occult trichomonis infection in 7% of patients in whom trichomonas had been specifically noted to be absent on ED wet mount exams.

4.3 Is Pap referral an alternative?

ED physicians were 10 times more likely to perform a Pap smear during January/February and May/June as they were to schedule a referral appointment during March/April and July/August. While 706 women received Pap smears during a 4 month period, only 66 women received referral appointments during a comparable period of time. This occurred in spite of regular reminders of ED personnel regarding patient referral, notices to patients and providers posted in examination rooms, and the removal of all Pap smear equipment from the ED during these months.

The apparent preference of ED physicians for performing a Pap rather than scheduling an appointment may reflect the perception that to perform a procedure at the time of physical exam is easier than to deal with additional, yet minimal, paper-work in a busy clinical environment. It may also represent a tendency to shift responsibility for non-urgent health care maintenance to the patient who is seen in an acute care setting.

Of the women who received appointments for Pap screening, 27%

kept their appointments. This is not surprising, given a previously reported 34% compliance rate in a study of 398 urban ED patients given non-urgent referral appointments (Strauss et al., 1983), and a 30% compliance to follow-up with gynecologic referrals reported from an urban ER in Texas (Levine et al., 1988). Thus, even with regular, individualized education of physicians and nurses to increase the rate of referral from the ED, these data suggest that at least a 70% lower rate of screening could be expected, compared to patients screened at the time of their pelvic exam in the ED.

Although the small number of referral patients who were screened precludes statistical comparison of this group with those who received Paps in the ED, demographics and Pap results were roughly similar in the two groups.

4.5 Limitations of the study

While our rates of follow-up and biopsy of patients with abnormal Pap smears equalled or exceeded those cited in other studies, follow-up procedures on those who returned were sometimes inadequate. This was in part due to limited colposcopy equipment and staffing in the gynecology clinic. Through increased cooperation within the county system and with additional resources, the quality of follow-up evaluation would improve.

For reasons of efficiency, our study contracted with a private pathologist to read all screening Pap smears performed in the ED and referral phases, as well as follow-up Pap smears on patients with initial Paps that showed benign atypia. A different pathologist, contracted by the Highland pathology department, read screening Paps from other clinic sites

during the period of the study. The comparison of rates of benign atypia and dysplasia between ED Paps from our study and those from other Highland sites is thus subject to observer variation (Ismail et al., 1989). It would be preferable to have Paps from all Highland sites screened by the same pathologist.

In spite of these limitations, we are able to conclude: 1) that a high prevalence of dysplasia, documented by biopsy and repeat Pap smear, is present in patients seen in the emergency department at HGH; 2) it is feasible to screen these patients at the time of pelvic exam in the ED, both in terms of quality of Pap obtained and ability to locate patients for appropriate follow-up; and 3) performing cervical cancer screening in the ED at the time of pelvic exam is more effective than referring these patients for Pap screening at a later date.

CHAPTER 5: POLICY IMPLICATIONS AND FUTURE STUDIES

Recent rises in incidence of sexually transmitted disease in urban minorities may foreshadow an increase in cervical cancer incidence in Alameda county in the next decade, unless interventions specifically target this high risk group.

This study demonstrates that the Emergency Department at Highland General Hospital is an appropriate setting for screening intervention in a population at high risk of developing cervical cancer. If cervical cancer screening was routinely performed in Highland's ED, each year 6 cases of early stage invasive cervical cancer could be diagnosed, and 75 cases of cervical cancer could potentially be prevented.

To insure high rates of follow-up of abnormal Paps, and to avoid losing patients due to diffusion of provider responsibility, it is important that follow-up of all abnormal Paps from the Emergency Department be coordinated by a single screening project team.

Future studies are indicated to assess the cost-effectiveness of different approaches to follow-up of abnormal Pap smears in the ED setting. One possibility for increasing access to and efficiency of follow-up would be a colposcopy clinic staffed by nurse practitioners whose specific responsibility would be follow-up of all women screened in the ED.

To achieve significant reductions of cervical cancer in Alameda County, a comprehensive screening program, adequately funded by state and federal governments, is needed. A cervical cancer screening data base

accessible to all county-based health facilities would facilitate identification of women who need screening, and expedite follow-up of those with abnormal Pap smears. Reliable Pap smear histories available to ED physicians at the time of pelvic exam, for example, could serve both as reminders to perform a Pap smear on some patients, and decrease duplication of smears on others.

A comprehensive cervical cancer screening program requires screening at multiple points in the medical delivery system. Emergency department based screening is an important component of such a plan.

REFERENCES AND BIBLIOGRAPHY

Acs J, Hildesheim A, Reeves WC, Brenes M, Brinton L, Lavery C, de la Guardia ME, Godoy J and Rawls WE. Regional distribution of Human Papillomavirus DNA and other risk factors for invasive cervical cancer in Panama. *Cancer Research* 1989; 49:5725-5729.

Anderson GH, Boyes DA, Benedet JL, Le Riche JC, Matisic JP, Suen KC, Worth AJ, Millner A and Bennett OM. Organisation and results of the cervical cytology screening programme in British Columbia, 1955-85. *Br Med J* 1988; 296:975-977.

Bang KM, White JE, Gause BL and Lefall LD. Evaluation of recent trends in cancer mortality and incidence among Blacks. *Cancer* 1988; 61:1255-1261.

Baquet C and Ringen K. Cancer control in blacks: epidemiology and NCI program plans. In: *Advances in Cancer Control: Health Care Financing and Research*. Alan R Liss, Inc, 1986; pp 215-227.

Baquet C and Ringen K. Health policy: gaps in access, delivery, and utilization of the Pap smear in the United States. *The Milbank Quarterly* 1987; 65, Suppl.2:322-347.

Berg JW, Ross R and Latourette HB. Economic status and survival of cancer patients. *Cancer* 1977; 39:467-477.

Boon ME, Alons-van Kordelaar JM and Rietveld-Scheffers PEM. Consequences of the introduction of combined spatula and cytpbrush sampling for cervical cytology. Improvements in smear quality and detection rates. *Acta Cytol* 1986; 30(3):264-270.

Breslow L and Hochstim JR. Sociocultural aspects of cervical cytology in Alameda County, Calif. *Public Health Reports* 1964; 79(2):107-112.

Briggs RM, Holmes KK, Kiviat N, Barker E, Eschenbach DA and DeJong R. High prevalence of cervical dysplasia in STD clinic patients warrents routine cytologic screening. *Am J Public Health* 1980; 70:1212-1214.

Brinton LA and Fraumeni JF. Epidemiology of uterine cervical cancer. *J Chron Dis* 1986; 39(12):1051-1065.

British Co-operative Clinical Group. Cervical cytology screening in sexually transmitted disease clinics in the United Kingdom. *Genitourin Med* 1987; 63:40-43.

Brown MS and Phillips GL. Management of the mildly abnormal Pap smear: a conservative approach. *Gynecol Oncol* 1985; 22:149-153.

California Tumor Registry. Cancer Registration and Survival in California. Berkeley, California State Department of Public Health, 1963.

Chamberlats J. Failures of the cervical cytology screening programme. *Br Med J* 1984; 289(6449):853-854.

Christopherson WM and Parker JE. Control of cervix cancer in women of low income in a community. *Cancer* 1969; 24(1):64-69.

Christopherson WM, Parker JE, Mendez WM and Lundin FE. Cervix cancer death rates and mass cytologic screening. *Cancer* 1970; 26(2):808-811.

Clarke EA and Anderson TW. Does screening by "PAP" smears help prevent cervical cancer? A case-control study. *Lancet* 1979; ii:1-4.

Cramer DW. The role of cervical cytology in the declining morbidity and mortality of cervical cancer. *Cancer* 1974; 34:2018-2027.

Davesa SS and Diamond EL. Association of breast cancer and cervical cancer incidences with income and education among whites and blacks. *JNCI* 1980; 65(3):515-528.

Davesa SS. Descriptive epidemiology of cancer of the uterine cervix. *Obstet Gynecol* 1984; 63(5):605-612.

Day NE. Effect of cervical cancer screening in Scandinavia. *Obstet Gynecol* 1984; 63:714-718.

Draper GJ and Cook GA. Changing patterns of cervical cancer rates. *Br Med J* 1983; 287:510-512.

Eddy DM. Appropriateness of cervical cancer screening. *Gynecol Oncol* 1981; 12:S168-S187.

Elias A, Linthorst G, Bekker B and Vooijs PG. The significance of endocervical cells in the diagnosis of cervical epithelial changes. *Acta Cytol* 1983; 27:225-229.

Fasal E, Simmons ME and Kampert JB. Factors associated with high and low risk of cervical neoplasia. *JNCI* 1981; 66(4):631-636.

Fenoglio CM and Ferenczy A. Etiologic factors in cervical neoplasia. *Semin Oncol* 1982; 9(3):349-372.

Fink DJ. Change in American Cancer Society checkup guidelines for detection of cervical cancer. *CA* 1988; 38(2):127-128.

Fraumeni JF Jr, Lloyd JL, Smith EM and Wagoner JK. Cancer mortality among Nuns: Role of marital status in etiology of neoplastic disease in women. *JNCI* 1969; 42:455-468.

Fruchter RG, Boyce J and Hunt M. Missed opportunities for early diagnosis of cancer of the cervix. *AJPH* 1980; 70(4):418-420.

Fruchter RG, Wright C, Habenstreit B, Remy JC, Boyce JG and Imperato PJ. Screening for cervical and breast cancer among Caribbean immigrants. *J Comm Health* 1985; 10(3):121-135.

Fruchter RG, Nayeri K, Boyce JG, Feldman JG and Burnett WS. Gynecologic cancer in Brooklyn, New York, 1978-1982. *NY State J Med* 1988; 88:466-473.

Fullilove RE, Fullilove MT, Browner BP and Gross SA. Risk of sexually transmitted disease among Black adolescent crack users in Oakland and San Francisco, Calif. *JAMA* 1990; 263(6):851-855.

Furgyik S and Astedt B. Gonorrheal infection followed by and increased frequency of cervical carcinoma. *Acta Obstet Gynecol Scand* 1980; 59:521-524.

Gambino R and Krieger P. False-negative fractions in cytology screening. *Lab Report* 1988; 10(7-8):61-63.

Giles JA, Hudson E, Crow J, Williams D and Walker P. Colposcopic assessment of the accuracy of cervical cytology screening. *Br Med J* 1988; 296:1099-1102.

Gottardi G, Gritti P, Marzi MM and Sideri M. Colposcopic findings in virgin and sexually active teenagers. *Obstet Gynecol* 1984; 63:613-615.

Graham S, Priore RL, Schueller EF and Burnett W. Epidemiology of survival from cancer of the cervix. *JNCI* 1972; 49(2):639-647.

Greening SE. The adequate Papanicolaou smear revisited. *Diagnostic Cytopathology* 1985; 1(1):55-58.

Greenwald P and Sondik EJ, eds. Cancer control objectives for the nation: 1985-2000. *NCI Monographs* 1986; 2:3-11.

Grubb GS. Human Papillomavirus and cervical neoplasia: epidemiological considerations. *Int J Epidemiol* 1986; 15(1):1-7.

Guzick J and Boyle P. Trends in cervical cancer mortality. *Cancer Surveys* 1988; 7(3):417-422.

Haan M, Kaplan GA and Camacho T. Poverty and health. Prospective evidence from the Alameda County Study. *Am J Epidemiol* 1987; 125(6):989-998.

Hakama M. Cervical cancer: risk groups for screening. In: Screening for cancer of the uterine cervix. Hakama M, Miller AB and Day NE, eds. International Agency for Research on Cancer, Lyon, 1986; pp:213-216.

Hakama M and Louhivuori K. A screening programme for cervical cancer that worked. *Cancer Surveys* 1988; 7(3):403-416.

Hayward RA, Shapiro MF, Freeman HE and Corey CR. Who gets screened for cervical and breast cancer? Results from a new national survey. *Arch Intern Med* 1988; 148:1177-1181.

Howard J. 'Avoidable mortality' from cervical cancer: exploring the concept. *Soc Sci Med* 1987; 24(6):507-514.

Ismail SM, Colclough AB, Dinnen JS, Eakins D, Evans DMD, Gradwell E, O'Sullivan JP, Summerell JM and Newcombe RG. Observer variation in histopathological diagnosis and grading of cervical intraepithelial neoplasia. *Br Med J* 1989; 298:707-710.

Johannesson G, Geirsson G and Day N. The effect of mass screening in Iceland, 1965-74, on the incidence and mortality of cervical carcinoma. *Int J Cancer* 1978; 21:418-425.

Jones DED, Creasman WT, Dombroski RA, Lentz SS and Waeltz JL. Evaluation of the atypical Pap smear. *Am J Obstet Gynecol* 1987; 157:544-549.

Kaiser RF, Erickson CC, Everett BE, Gilliam AG, Graves LM, Walton M and Sprunt DH. Initial effect of community-wide cytologic screening on clinical stage of cervical cancer detected in an entire community. Results of Memphis-Shelby County, Tennessee, Study. *JNCI* 1960; 25:863-881.

Kaminski PF, Sorosky JJ, Wheelock JB and Stevens CW. The significance of atypical cervical cytology in an older population. *Obstet Gynecol* 1989; 73:13-15.

Kaplan GA, Haan MN, Syme SL, Minkler M and Winkleby M. Socioeconomic status and health. In: *Closing the Gap. The Burden of Unnecessary Illness*. Amler RW and Dull HB, eds. Oxford University Press, 1987; pp 125-129.

Karsai H, Coldman AJ, Gavin D, Burmelle S, Boyes DA, Anderson GH and Benedet JL. Cervical intraepithelial neoplasia in female prisoners in British Columbia. *CMAJ* 1988; 139:733-735.

Keighley E. Carcinoma of the cervix among prostitutes in a women's prison. *Brit J Vener Dis* 1968; 44:254-255.

Kessler II. Etiological concepts in cervical carcinogenesis. *Gynecol Oncol* 1981; 12:S7-S24.

Kinlen LJ and Spriggs AI. Women with positive cervical smears but without surgical intervention. A follow-up study. *Lancet* 1978; ii:463-465.

Kivlahan C and Ingram E. Papanicolaou smears without endocervical cells. Are they inadequate? *Acta Cytologica* 1986; 30:258-260.

Kleinman JC and Kopstein A. Who is being screened for cervical cancer? *AJPH* 1981; 71(1):73-76.

Knox EG and Woodman CBJ. Effectiveness of a cancer control programme. *Cancer Surveys* 1988; 7(3):379-400.

Koss LG, Stewart FW, Foote FW, et al. Some histological aspects of behavior of epidermoid carcinoma in situ and related lesions of the uterine cervix. *Cancer* 1963; 9:1160-1211.

Koss LG. Dysplasia: a real concept or a misnomer? *Obstet Gynecol* 1978; 51(3):374-379.

Koss LG. The Papanicolaou test for cervical cancer detection. A triumph and a tragedy. *JAMA* 1989; 261:737-743.

Kwikkel HJ, Quaak MJ and de With C. Predictive value of the abnormal PAP smear: a retrospective analysis of error rates. *Eur J Obstet Gynecol Reprod Biol* 1986; 21:101-112.

Larsen PM, Vetner M, Hansen K and Fey SJ. Future trends in cervical cancer. *Cancer Letters* 1988; 41:123-137.

La Vecchia C, Franceschi S, Decarli A, Fasoli M, Gentile A and Tognoni G. "PAP" smear and the risk of cervical neoplasia: quantitative estimates from a case-control study. *Lancet* 1984; ii:779-782.

La Vecchia C. The epidemiology of cervical neoplasia. *Biomedicine & Pharmacotherapy*, 1985; 39:426-433.

La Vecchia C, Decarli A and Gallus G. Epidemiological data on cervical carcinoma relevant to cytopathology. *Appl Pathol* 1987; 5:25-32.

Laverty CR, Farnsworth A, Thurloe JK and Bowditch RC. The importance of the cell sample in cervical cytology: a controlled trial of a new sampling device. *Med J Aust* 1989; 150:432-436.

Levi F, La Vecchia C, Te VC and Gutzwiller F. Incidence of invasive cervical cancer in the Swiss canton of Vaud, and a note on screening. *J Epidemiol Community Health* 1989; 43(2):121-124.

Levine MM, Coffman DS, Gardner AF and Tovar RT. The use of the emergency department for routine Pap smear examinations in a high-risk patient population. *Annals of Emergency Med* 1988; 17:422.

Lipworth L, Abelin T and Connelly RR. Socio-economic factors in the prognosis of cancer patients. *J Chron Dis* 1970; 23:105-116.

Lundin FE, Christopherson WM, Mendez WM and Parker JE. Morbidity from cervical cancer: effects of cervical cytology and socioeconomic status. *JNCI* 1965; 35(2):1015-1025.

Lunt R. Worldwide early detection of cervical cancer. *Obstet Gynecol* 1984; 63(5):708-713.

Lynge E, Madsen M and Engholm G. Effect of organized screening on incidence and mortality of cervical cancer in Denmark. *Cancer Research* 1989; 49:2157-2160.

Lynge E. Screening for cancer of the cervix uteri. *World J Surg* 1989; 13:71-78.

MacCormac L, Lew W, King G and Allen PW. Gynaecological cytology screening in South Australia: a 23-year experience. *Med J Aust* 1988; 149:530-536.

Macgregor JE, Moss SM, Parkin DM and Day NE. A case-control study of cervical cancer screening in north east Scotland. *Br Med J* 1985; 290:1543-1546.

Makuc DM, Freid VM and Kleinman JC. National trends in the use of preventive health care by women. *Am J Public Health* 1989; 79:21-26.

Mandelblatt J, Gopaul I and Wistreich M. Gynecological care of elderly women. Another look at Papanicolaou smear testing. *JAMA* 1986; 256:367-371.

Mandelblatt JS and Fahs MC. The cost-effectiveness of cervical cancer screening for low-income elderly women. *JAMA* 1988; 259:2409-2413.

Mandelblatt J. Cervical cancer screening in primary care: issues and recommendations. *Primary Care*, 1989; 16(1):133-155.

Marcus AC, Crane LA, Kaplan CP, Goodman KJ, Savage E and Gunning J. Screening for cervical cancer in emergency centers and sexually transmitted disease clinics. *Obstet Gynecol* 1990; 75:453-455.

McCormick JS. Cervical smears: a questionable practice? *Lancet* 1989; ii(8656):207-209.

McDougall JK, Galloway DA, Crum C, Levine R, Richart R and Fenglio CM. Detection of nucleic acid sequences in cervical tumors. *Gynecol Oncol* 1981; 12:S42-S55.

McPhee SJ, Richard RJ and Solkowitz SN. Performance of cancer screening in a university general internal medicine practice: comparison with the 1980 American Cancer Society Guidelines. *J Gen Intern Med* 1986; 1:275-281.

Meisels A and Morin C. Human Papillomavirus and cancer of the uterine cervix. *Gynecol Oncol* 1981; 12:S111-S123.

Miller AB, Lindsay J and Hill GB. Mortality from cancer of the uterus in Canada and its relationship to screening form cancer of the cervix. *Int J Cancer* 1976; 17:602-612.

Miller AB. Screening for cancer: issues and future directions. *J Chron Dis* 1986; 39(12):1067-1077.

Mitchell H and Medley G. Pap smear results of Victorian teenagers, 1980-1987. *Aust NZ J Obstet Gynaecol* 1988; 28:213-215.

Moghissi KS and Mack HC. Epidemiology of cervical cancer. Study of a prison population. *Am J Obstet Gynecol* 1968; 100(5):607-614.

Moodie PJS, Kljakovic M and McLeod DK. An audit of a cervical smear screening programme. *NZ Med J* 1989; 102:374-376.

Morell NC, Taylor JR, Snyder RN, Ziel HK, Saltz A and Willie S. False-negative cytology rates in patients in whom invasive cervical cancer subsequently developed. *Obstet Gynecol* 1982; 60:41-45.

Murphy MFG, Campbell MJ and Goldblatt PO. Twenty years' screening for cancer of the uterine cervix in Great Britain, 1964-84: further evidence for its ineffectiveness. *J Epidemiol Community Health* 1987; 42:49-53.

National Cancer Institute: Cancer among Blacks and other minorities: statistical profiles. NIH Pub No. 86-2785. Bethesda, Maryland: NCI, 1986.

Office of Surveillance and Analysis and Cancer Prevention and Control Br. Black-white differences in cervical cancer mortality - United States, 1980-1987. *MMWR* 1990; 39(15):245-248.

Otten MW, Teutsch SM, Williamson DF and Marks JS. The effect of known risk factors on the excess mortality of Black adults in the United States. *JAMA* 1990; 263:845-850.

Parkin DM, Laara E and Muir CS. Estimates of the worldwide frequency of sixteen major cancers in 1980. *Int J Cancer* 1988; 41:184-197.

Peters WM and Kershaw JB. Cervical cytology screening. [Letter] *Br Med J* 1988; 296:1670.

Quinn MA. Screening for cervical cancer - where are we going wrong? *Med J Aust* 1989; 150:414-415.

Ragland KE. Black-White differences in cancer survival: Analysis from eight selected sites. Unpublished paper, 1988.

Rawls WE, Lavery C, Marrett LD, Clarke EA, Adam E, Melnick JL, Best JM, Kraiselburd E, Benedet LF, Brenes MM, Quiroz E and Reeves WC. Comparison of risk factors for cervical cancer in different populations. *Int J Cancer* 1986; 37:537-546.

Reeves WC, Brinton LA, Garcia M, Brenes MM, Herrero R, Gaitan E, Tenorio F, de Britton RC and Rawls WE. Human Papillomavirus infection and cervical cancer in Latin America. *N Engl J Med* 1989; 320(22):1437-1441.

Reissman SE. Comparison of two Papanicolaou smear techniques in a family practice setting. *Journal of Family Practice* 1988; 26(5):525-529.

Robbins SL, Cotran RS and Kumar V. *Pathologic Basis of Disease*. Third edition. Philadelphia: WB Saunders Company, 1984; pp 1125-1127.

Sadeghi S, Sadeghi A and Robboy SJ. Prevalence of dysplasia and cancer of the cervix in a nationwide, Planned Parenthood population. *Cancer* 1988; 61:2359-2361.

Saunders LD. Differences in the timeliness of diagnosis, breast and cervical cancer, San Francisco 1974-85. *AJPH* 1989; 79(1):69-70.

Sawyer JA, Earp JA, Fletcher RH, Daye F and Wynn TM. Accuracy of women's self-report of their last Pap smear. *Am J Public Health* 1989; 79:1036-1037.

Schwartz SM and Weiss NS. Increased incidence of adenocarcinoma of the cervix in young women in the United States. *Am J Epidemiol* 1986; 124(6):1045-1047.

Sebastian JA, Leeb BO and See R. Cancer of the cervix-A sexually transmitted disease. Cytologic screening in a prostitute population. *Am J Obstet Gynecol* 1978; 131:620-623.

Sigurdsson K, Adalsteinsson S, Tulinius H and Ragnarsson J. The value of screening as an approach to cervical cancer control in Iceland, 1964-1986. *Int J Cancer* 1989; 43:1-5.

Silverberg E, Boring CC and Squires TS. Cancer statistics, 1990. *Ca-A Cancer Journal for Clinicians* 1990; 40(1):9-26.

Smith A. Cervical cytology screening. [Letter] *Br Med J* 1988; 296:1670.

Stenkivist B, Bergtrom R, Eklund G and Fox C. Papanicolaou smear screening and cervical cancer. What can you expect? *JAMA* 1984; 252(11):1423-1426.

Straus JH, Orr ST and Charney E. Referrals from an emergency room to primary care practices at an urban hospital. *Am J Public Health* 1983; 73:57-61.

Tait IA, Alawattagama AB and Rees E. Screening for cervical dysplasia in department of genitourinary medicine. *Genitourin Med* 1988; 64:255-258.

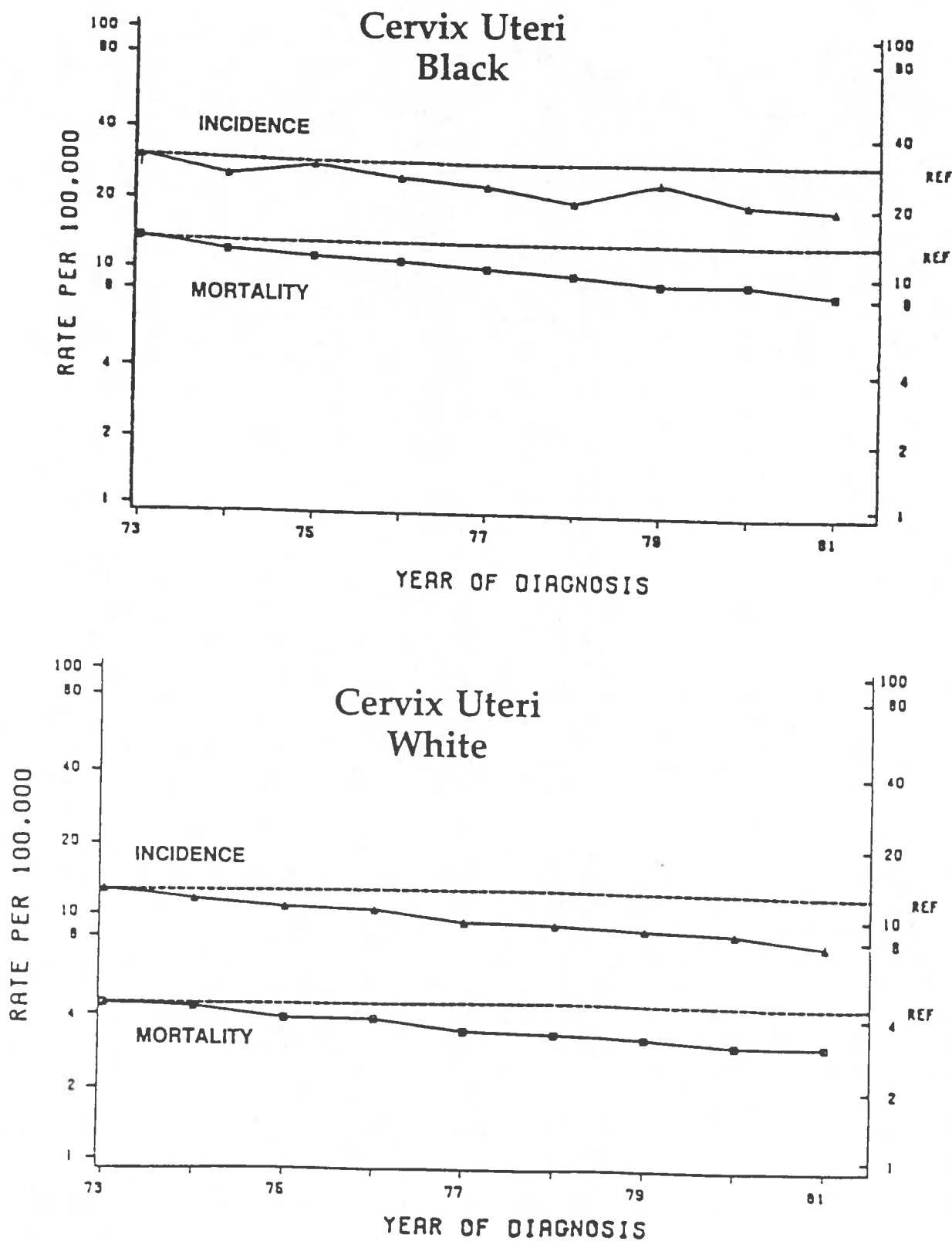
US Department of Health and Human Services. SEER Program: Cancer Incidence and Mortality in the US, 1973-81. NIH Publication # 85-1837; 1984.

Warnecke RB and Graham S. Characteristics of Blacks obtaining Papanicolaou smears. *Cancer* 1976; 37:2015-2025.

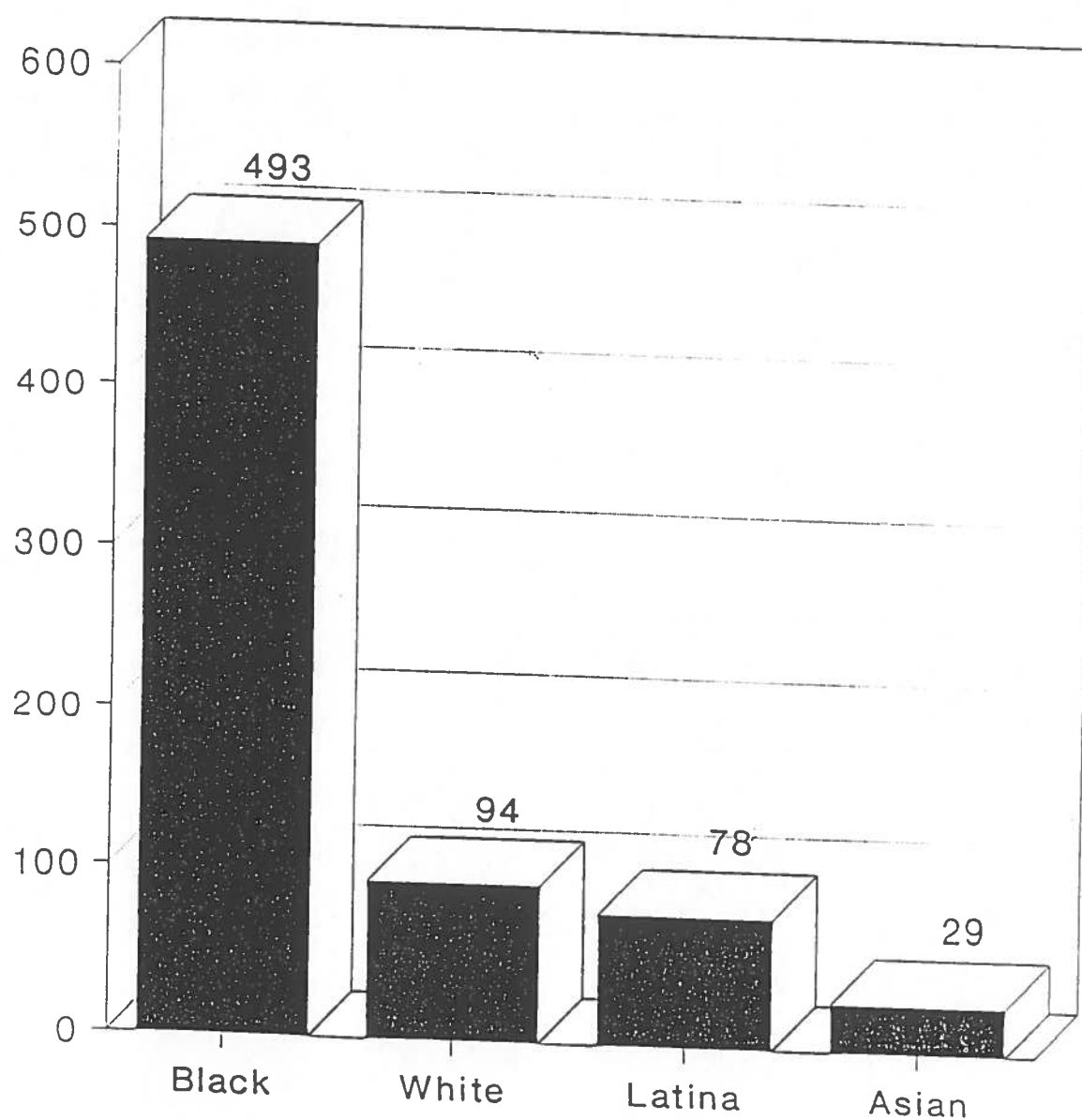
Wilson JD, Robinson AJ, Kinghorn SA and Hicks DA. Implications of inflammatory changes on cervical cytology. *Br Med J* 1990; 300:638-640.

Young JL, Ries LG and Pollack ES. Cancer patient survival among ethnic groups in the United States. *JNCI* 1984; 73:341-352.

Age-adjusted Incidence and Mortality Rates per 100,000 by Year of Diagnosis: 1973-81

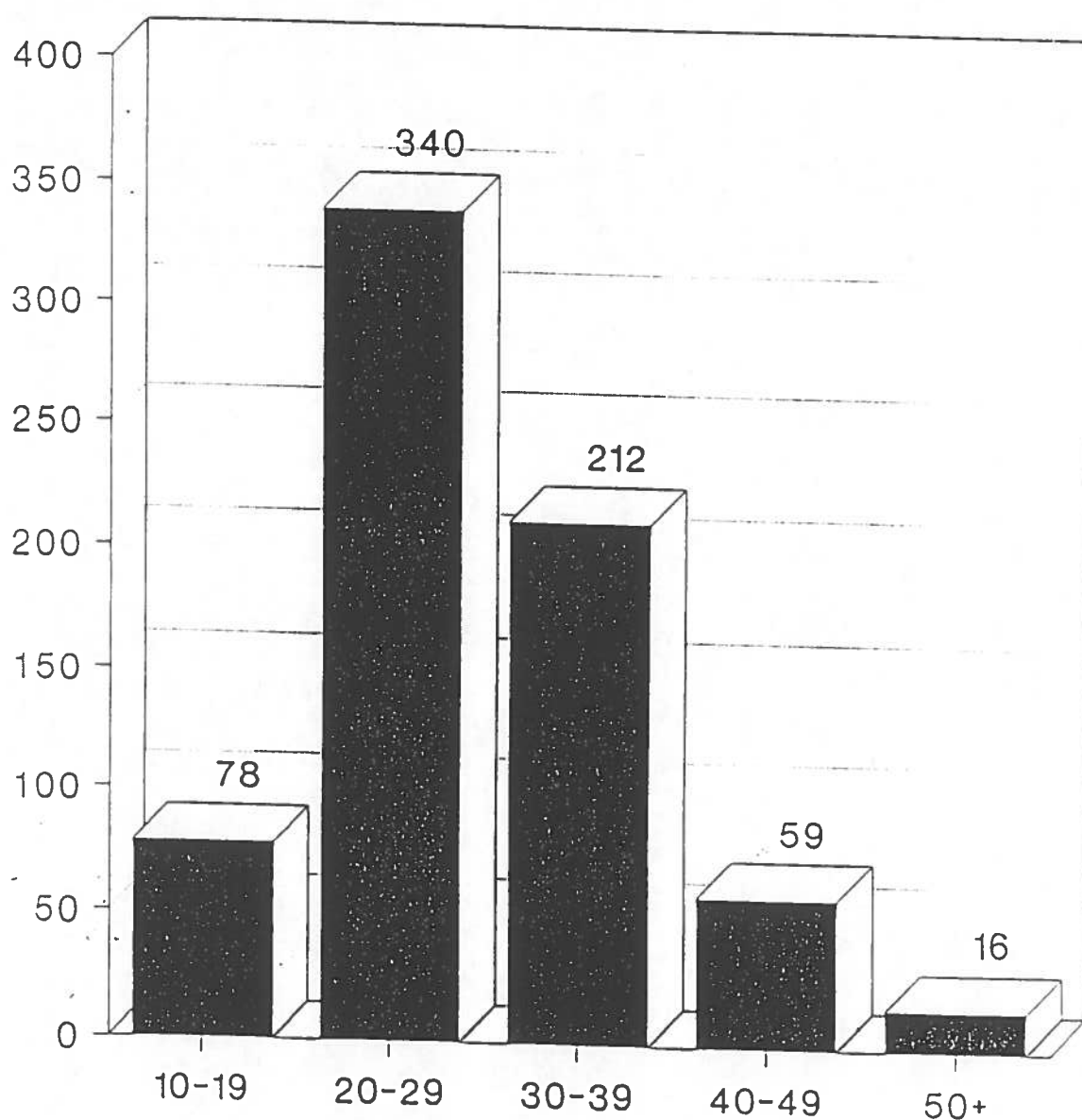


Racial Distribution of Women Screened in the emergency department



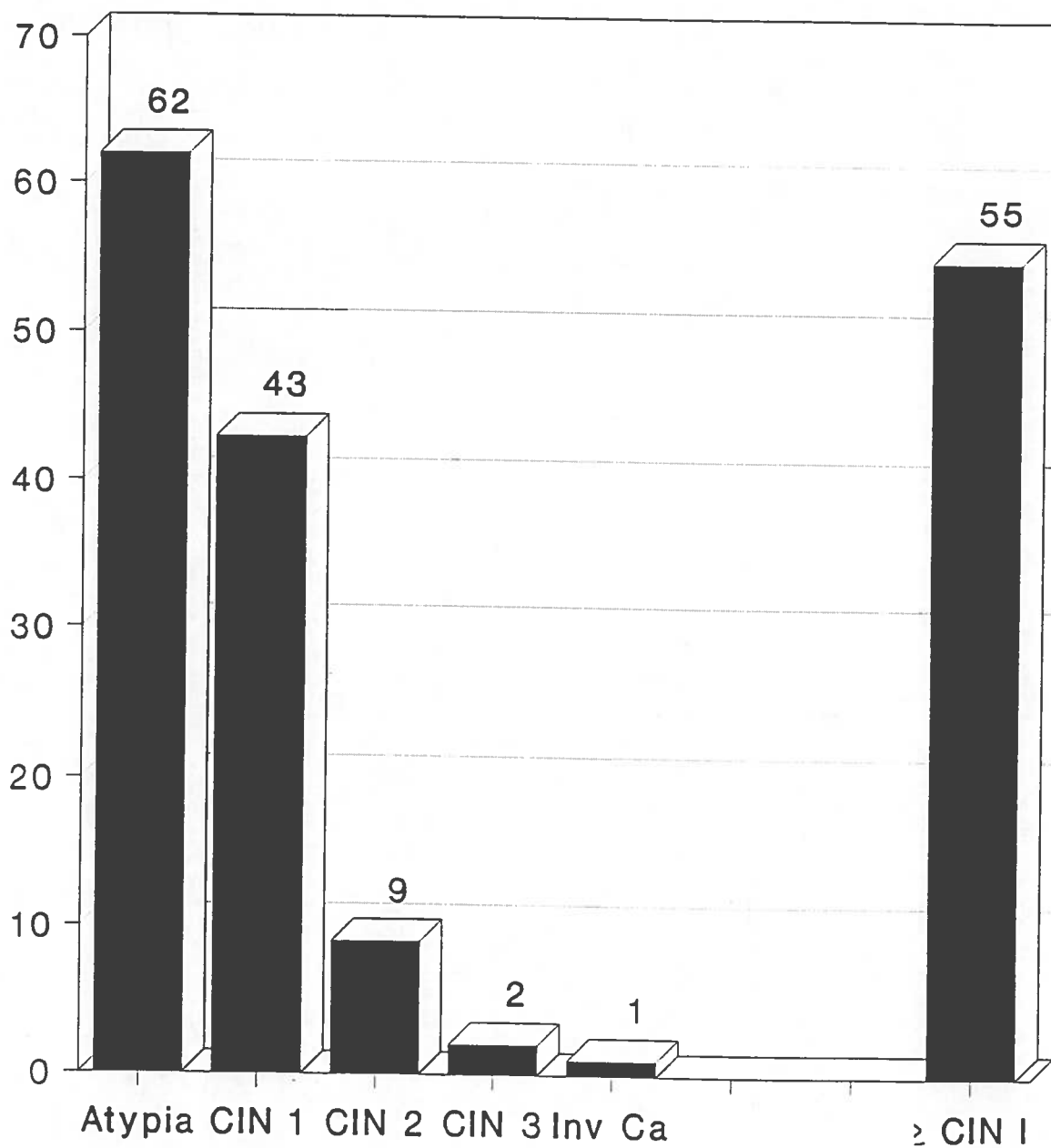
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Age Distribution of Women Screened in the emergency department



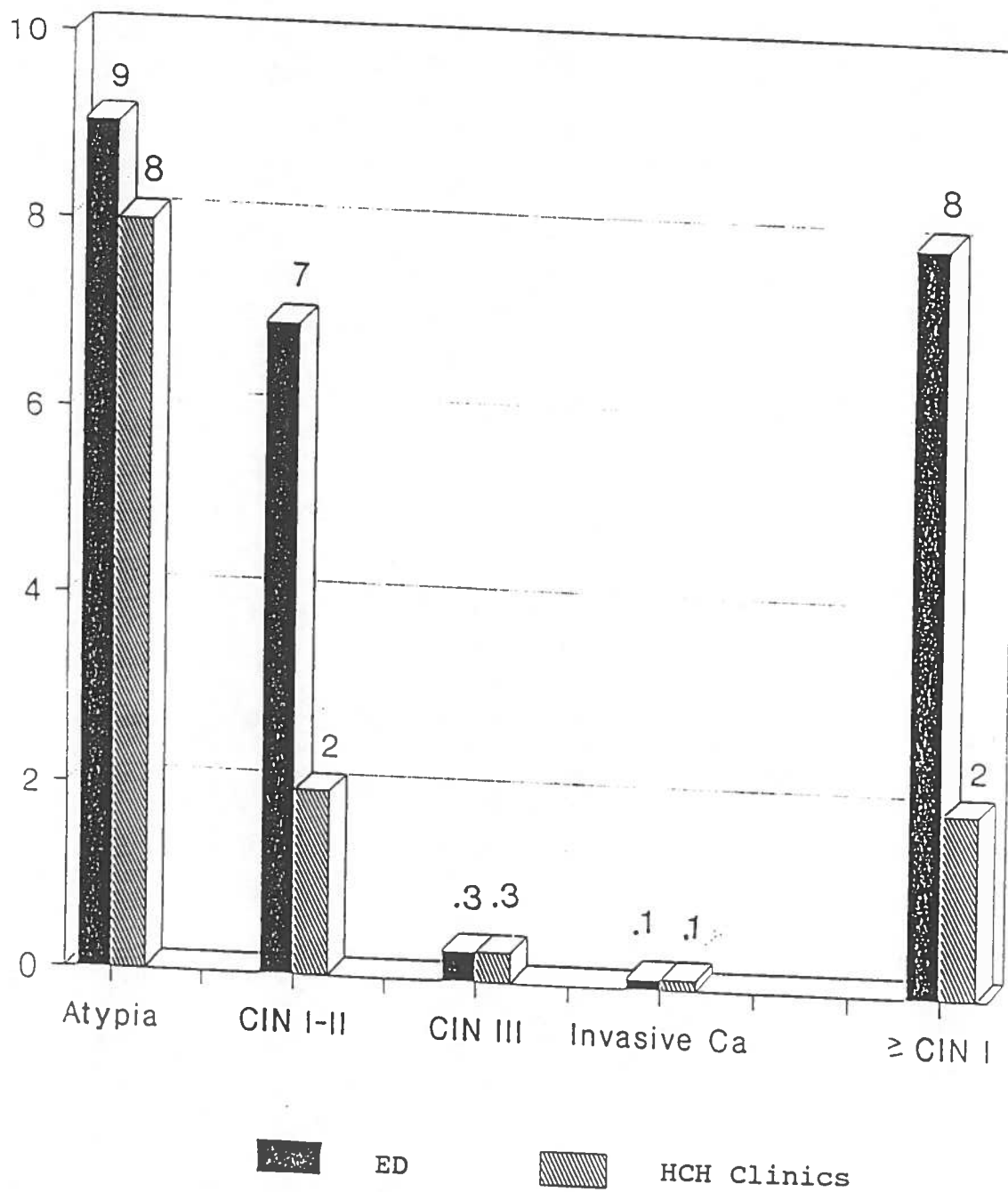
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Abnormal Pap Smears E.D. Screening



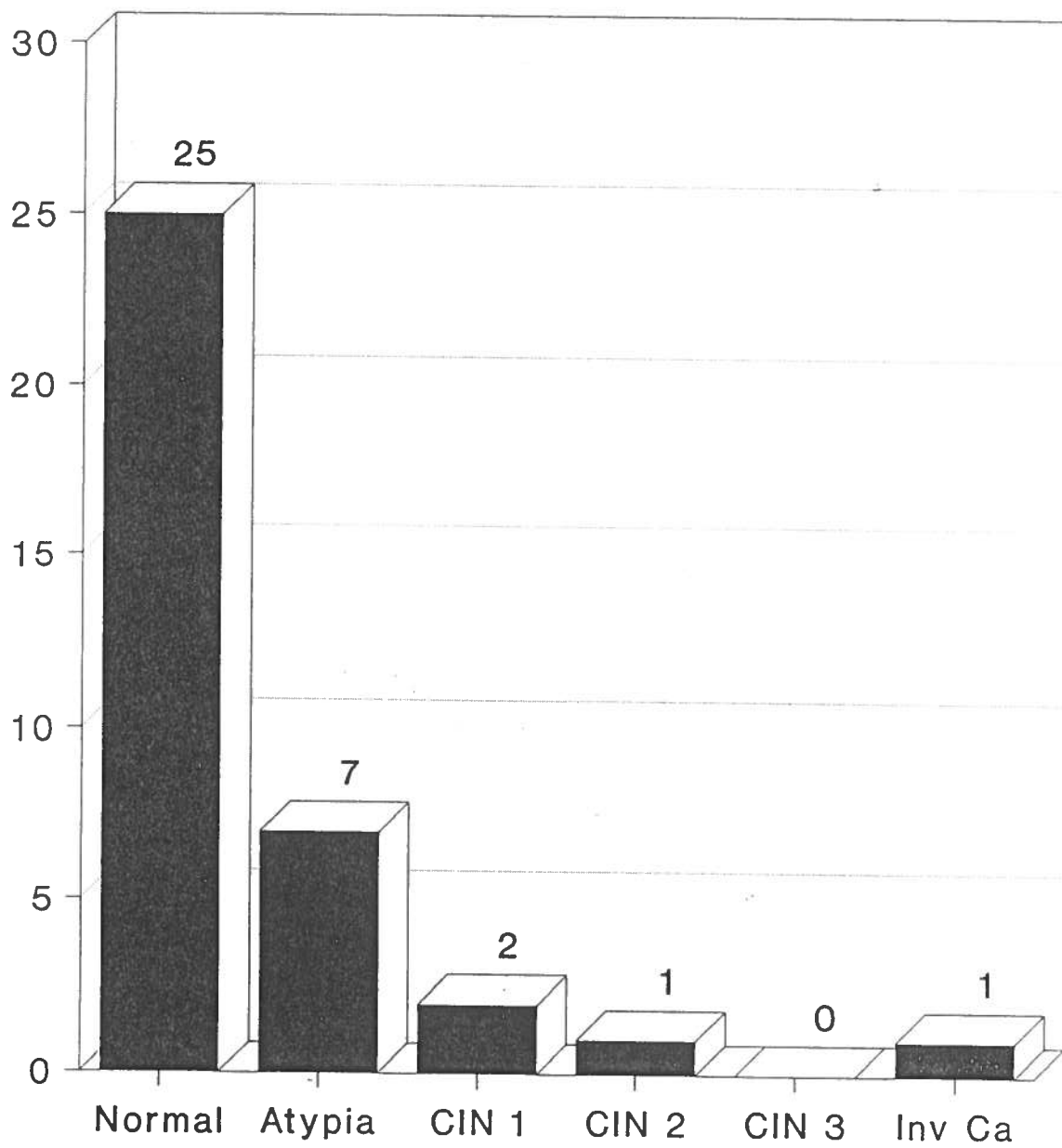
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Rates of Abnormal Pap Smears* Emergency Department and HGH Clinics



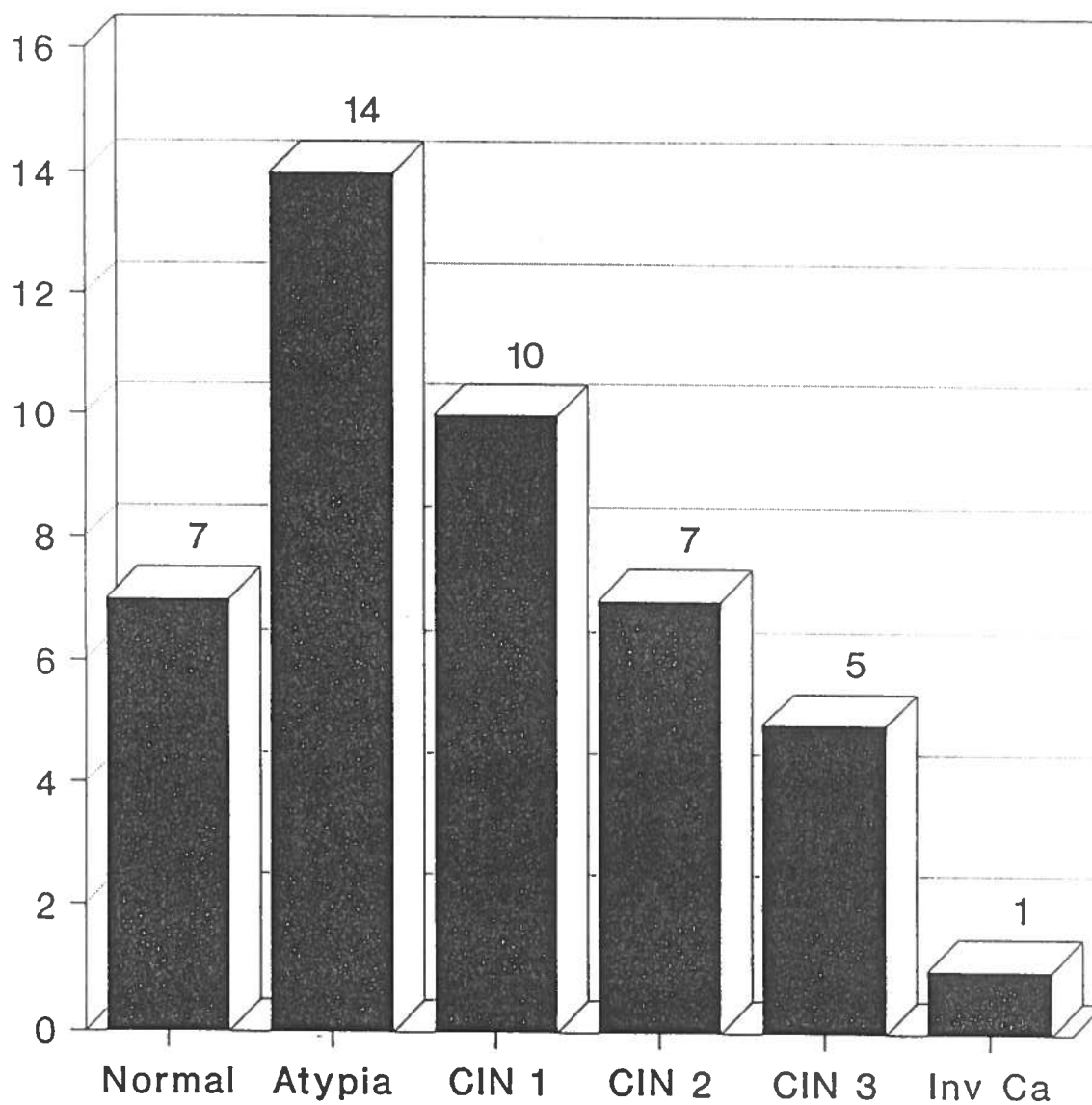
* per 100 women screened during 4 months

Final Diagnosis Following an Atypical Pap



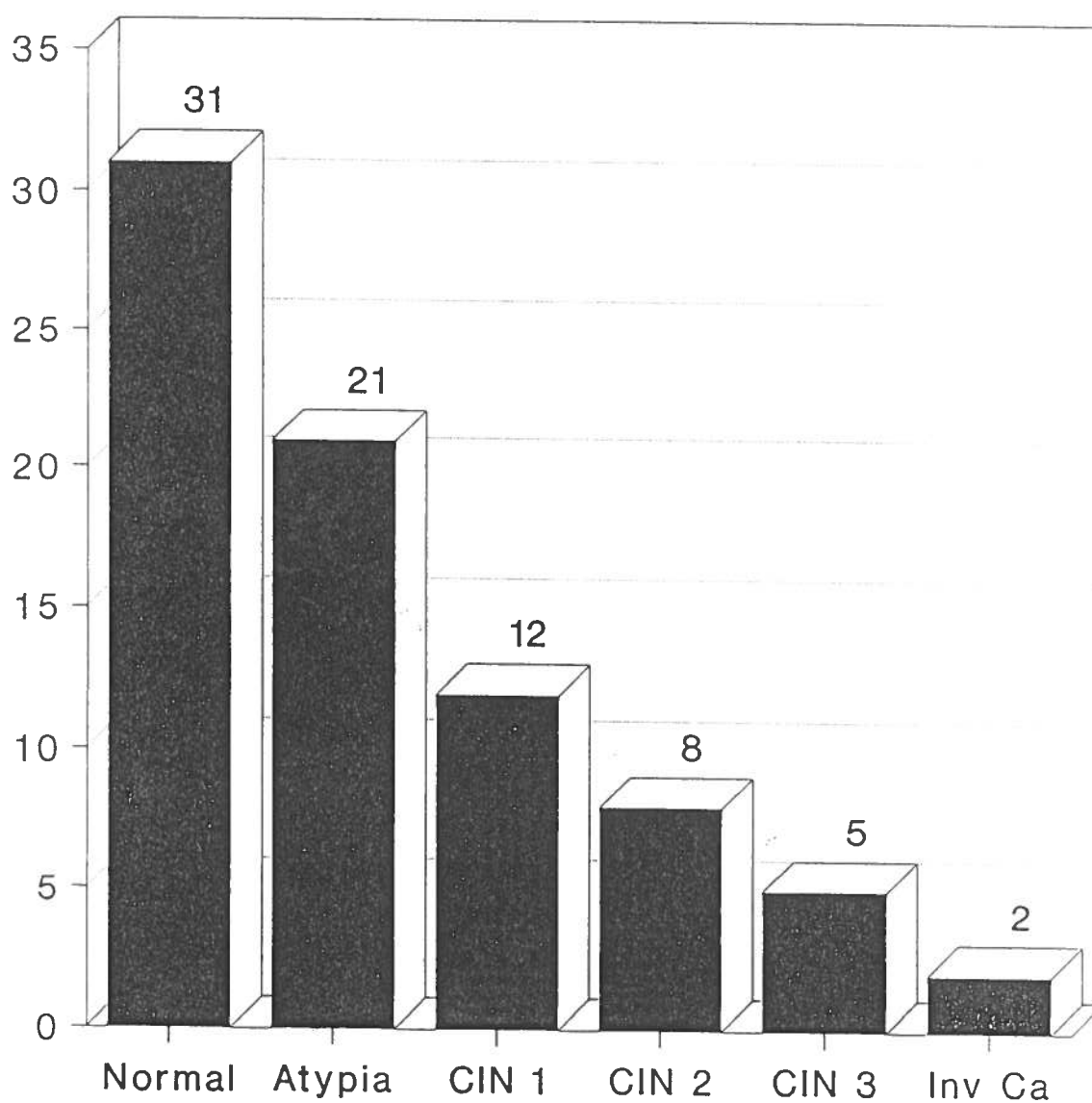
Confirmed by repeat Pap or biopsy

Final Diagnosis Following a Pap of CIN 1 or greater



Confirmed by repeat Pap or biopsy

Final Diagnosis following an abnormal Pap (benign atypia or dysplasia)



Confirmed by repeat Pap or biopsy