Towards a rational cervical cytology screening strategy

Case study of a peri-urban settlement

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Objectives. To assess cervical cytology screening activity in a peri-urban settlement near Cape Town, with a view to informing rational policy development.

Method. Total and age-specific prevalence rates of women who had been screened, relative prevalence by age group of women who had not been screened, and yield of screening were estimated from cytopathology laboratory records and available demographic data. Age-specific prevalence rates among women who had been screened were compared with age at presentation with cervical cancer at the referral hospital. Attendance for colposcopy follow-up was assessed from colposcopy clinic records.

Results. The number of smears taken and the prevalence of women who had been screened peaked in the 20 - 24-year age group, and declined to low levels in those over the age of 40 years. The relative prevalence of those who had not had a smear exceeded 9 in all age groups over 39 years, compared with women of 20 - 24 years. Smears which showed signs of CIN III, malignancy or possible malignancy comprised 0,13%. Thirty-six per cent of women booked for colposcopy did not attend.

Conclusions. Efficiency of screening could be improved by emphasising coverage of higher-risk age groups, e.g. women over the age of 30 years, and better follow-up.

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The official policy of the Department of National Health and Population Development (DNHPD) in respect of cervical cytology screening is broadly consistent with the recommendations of working groups in developed countries such as Canada[1] and New Zealand.[2] This policy requires screening at 3-yearly intervals of all women for most of their adult lives.

The policy is unrealistic and impractical for South Africa. As a consequence, screening practice is largely opportunistic. As in other countries,[3-7] many women are screened, but they tend to be those at relatively low risk and may be screened more frequently than necessary.[8] This results in consumption of resources which could be better spent on a rational screening programme which includes the high-risk groups.[7,9]

Despite evidence of the effectiveness of organised cervical cytology screening programmes, and repeated calls in the local medical literature,[10-13] South African medical services have failed to develop a rational screening policy.[14]

The aim of this study was to examine screening activity in Khayelitsha, a defined peri-urban settlement near Cape Town, over a 5-year period (1988 - 1992), with a view to informing the development of a rational screening policy.

Khayelitsha is the largest black urban residential area in the Western Cape, having been established in 1983. It has predominantly informal housing. In early 1992 the population was estimated to be between 300 000 and 350 000 (W. Lombard, Western Cape Regional Services Council — personal communication). Cervical cytology screening is carried out almost exclusively by family planning and maternity services, while the two day hospitals, which are responsible for general curative services, do very little screening.

Method

Data on cervical smears were obtained from the computerised records of Groote Schuur Hospital Cytopathology Laboratory. This laboratory processed all smears taken by public health services in Khayelitsha over the 5-year period. Total and age-specific prevalences of women who had a cervical smear were calculated for the period 1988 - 1992. The numerators for the calculations were the number of cervical smears taken within specific age groups. The denominator used was the 1991 demographic data from a report by Harrison and McQueen.[15] The resulting screening prevalence rates assume that each woman had at most one smear in the 5-year period. These rates therefore represent the maximum possible 5-year screening prevalence rates.

With the 5-year screening prevalence in the 20 - 24-year age group used as a reference, the relative prevalences of not having had a smear for women in other age groups were calculated, with 95% confidence intervals, using the Epi Info computer package.

The yield of screening was determined by dividing of the number of smears which showed signs of CIN III, malignancy or possible malignancy, by the total number of smears taken. (Only women with smears showing CIN III or more severe abnormalities are referred for colposcopy.)

The extent of successful follow-up was measured by determining the proportion of women whose smears showed signs of CIN III, who actually attended for assessment at the colposcopy clinic. Records of attendance were obtained from Groote Schuur Hospital's colposcopy clinic.

The maximum number of smears which each woman in the community could have had in the 5-year period, given uniform coverage and at current screening levels, was estimated by dividing the total number of smears done by the total number of women aged 15 years or more. The inverse of this number was then multiplied by 5 years to give

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an estimate, in years, of the period during which each woman could have been screened once under these hypothetical conditions.

The age distribution for screening was compared with the distribution of age at presentation with cervical carcinoma at Groote Schuur Hospital. Data on age at presentation were obtained by reviewing the records of all women who presented with cervical cancer for the first time in 1991.

Results

Information on the number of smears done relative to age group, the number showing signs of CIN III, and the number showing signs of malignancy or possible malignancy, the estimated number of women in the community in each age group, and the number of smears done per 1 000 women, is shown in Table I.

Table I. Number of smears (total and abnormal) and number of smears per 1 000 women for specific age groups, 1988 - 1992

Age (yrs)	No. of smears	CIN III	Malignant/ possibly malignant	No. of women (1991)	No. of smears/ 1 000 women
15 - 19	5 667	1	0	20 000	283
20 - 24	9 726	6	1	19 678	494
25 - 29	7 102	11	0	19 400	366
30 - 34	4 302	3	0	18 504	232
35 - 39	1 901	7	0	14 776	129
40 - 44	511	3	0	9 500	54
45 - 49	229	1	0	6 000	38
50 - 54	120	1	1	3 505	34
55 - 59	73	2	1	2 090	35
60 - 64	37	1	0	2 000	19
65+	71	0	1	1 865	38
Total	29 739	36	4	117 318	253

The number of smears taken, as well as the number of smears per 1 000 women (i.e. the maximum possible 5-year screening prevalence), peaked in the 20 - 24-year age group and then steadily declined in each successive older group.

The likelihood of being screened relative to age

The relative 5-year prevalences of women who had not had a smear in different age groups, compared with women in the 20 - 24-year age group, are shown in Table II. The relative prevalence of women over the age of 24 years who had not had a smear rises rapidly, and exceeds 10 for all age categories over 45 years. Teenagers have a lower relative prevalence of not being screened than women aged 30 years and older. In other words, proportionately more teenagers aged 15 - 19 years had had a cervical smear taken than women of 30 years or older.

Maximum possible coverage under current conditions

The total number of women aged 15 years and over was estimated to be 117 318.[15] The total number of smears recorded by the cytopathology laboratory as coming from Khayelitsha was 29 739. Given uniform coverage, this would indicate that approximately 1 woman in 4 had had a smear in the 5-year period of this study. Or, given the hypothetical situation where all other factors remained constant, it would allow each woman to be screened once every 20 years.

Table II. Relative prevalence of not having had a smear by 5-year age group, using the 20 - 24-year age group as reference, 1988 - 1992

Age	Relative prevalence	95% confidence interval
15 - 19	1,74	1,70 - 1,79
20 - 24	1,00	
25 - 29	1,35	1,32 - 1,38
30 - 34	2,13	2,06 - 2,19
35 - 39	3,84	3,68 - 4,02
40 - 44	9,19	8,44 - 10,01
45 - 49	12,95	11,40 - 14,72
50 - 54	14,44	12,10 - 17,22
55 - 59	14,15	11,29 - 17,74
60 - 64	26,72	19,41 - 36,78
64+	12,98	10,33 - 16,32

Yield

In the 5-year period 1988 - 1992, 36 smears showed signs of CIN III, 2 showed signs of malignancy, and 2 the possibility of malignancy. The yield was thus 0,13%. In other words, for every 10 000 smears taken, 13 women required follow-up.

Follow-up at colposcopy

Of the 36 women whose smears showed signs of CIN III, 23 had attended for assessment at the colposcopy clinic. This represents a follow-up rate of 64%.

Age at presentation with cervical cancer

The distribution of age at presentation with cervical carcinoma at Groote Schuur Hospital in 1991 is shown in Fig. 1. There is a steady increase in the number of cases (N = 131) to a peak in the 50 - 54-year age group, with a slight decline in the older age groups. Over 80% of patients presented at 40 years or older. The age distribution of smears per 1 000 women is superimposed.

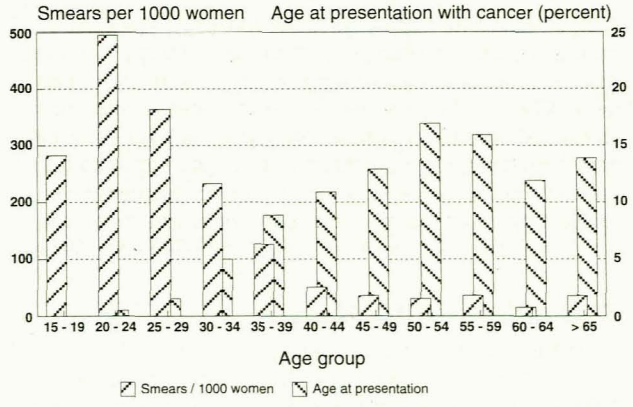

Fig. 1. Smears per 1 000 women by age group v. age at presentation with cervical cancer.

Discussion

Limitations

This study is limited by the crudeness of the data used, both for the numerator and the denominator. For the numerator, the estimates made of screening frequency were based on the assumption that each woman who was screened in this period had only one smear. It is highly likely that some women were screened more than once during the 5-year period. The screening frequency estimates are therefore a 'best scenario'. This implies that the true screening frequency of the number of individual women who had been screened would be lower (i.e. the interval between smears would be longer than 20 years).

Furthermore, the possibility of women being screened at services outside Khayelitsha may have led to an artificially low figure for the number of smears recorded in this community. However, the number of such women is believed to be small, given very low employment levels, and thus little reason or limited resources for travel outside Khayelitsha.

The accuracy of the relative prevalence estimates assumes that the proportion of women who are rescreened are similar in both the age group of interest and the reference group. This study does not provide information as to whether this is the case or not. However, the magnitude of the relative prevalence estimates indicates that there is a real difference in the likelihood that women in the different groups have been screened, even if the estimated size of the difference is imprecise.

Demographic data for black people in this country are notoriously poor. The data used in this study are the best available estimates. The estimates of the number of smears per woman (and the likelihood of being screened) are therefore crude. However, the magnitude of the differences indicates that the differences are real, although not precise.

The comparison of the number of smears per woman in the different groups would be affected by inaccuracies in the estimate of the age distribution within the population, and not simply by inaccuracies in the estimation of the total number of women. Here again the magnitude of the difference between age groups in the number of smears per woman indicates that the differences are real.

Cervical carcinoma in context

Although cervical carcinoma is the most important cause of cancer mortality in black women in South Africa,[16] this disease should be viewed against the background of the general health status of people living in communities such as Khayelitsha. Many other preventable causes of mortality and morbidity have a greater impact on the health status of the community.[15] A cervical cancer control programme in Khayelitsha must therefore compete for scarce resources with a number of other programmes of proven effectiveness.

Screening interval

It has been proposed that all women be screened once over the next 5 years.[14] Assuming uniform coverage can be achieved, the findings of this study indicate that in order to screen each woman once over the next 5 years, screening services would have to be increased at least fourfold in this community. As it is unlikely that there was uniform coverage, a more than fourfold increase in services is needed. Given the other health service needs in this community and the resource constraints, the proposal is impracticable.

The likelihood of being screened relative to age

The findings indicate that women in the age groups at which premalignant lesions are most likely to occur are considerably less likely to be screened than those in the younger low-risk age groups of the population. This is clearly highlighted in Fig. 1, and represents a grossly inefficient use of resources.

It can be seen that the peak in the number of smears per woman occurs at an age approximately 30 years younger than the peak age at presentation for cervical cancer. Given the 10 - 15-year period for progression from CIN III to invasive cancer,[17,18] the vast majority of women who are going to develop cancer will be missed if women are not screened at an older age than most of the women screened in the period of this study. Infiltrating cancer of the cervix is predominantly a disease of middle-aged and older women. Over 75% of patients who present at Groote Schuur Hospital are over the age of 39 years (Fig. 1). A screening programme concentrating on women over the age of 30 years would therefore produce an increased yield.

Yield, follow-up and number of cancers prevented

The yield of screening, as measured by the number of smears which required follow-up ('positive smears'), in relation to the total number of smears processed at the laboratory, is an overestimate of the true yield. The true yield should be based on the number of women with CIN III who are successfully followed up and attended for further investigation of the condition.

The proportion of women with 'positive smears' who were successfully followed up in the period of this study was 0,64. Thus, the true yield is approximately 0,08, or 8/10 000. Assuming that 50% of cases of CIN III progress to invasive cancer,[17] this would lead to the prevention of 4 cases of invasive cancer for every 10 000 smears taken. Thus the 29 739 smears taken over the 5-year period are estimated to have prevented the development of invasive cancer in 12 women, assuming all cases of CIN III were effectively treated.

The yield and rate of successful follow-up of abnormal cases have important implications for cost-effectiveness of the programme.

Conclusion

It is clear that the control of cervical cancer in Khayelitsha could be improved through the development of an organised screening programme by using the existing capacity in a more efficient manner. This study shows a marked discrepancy between need, in terms of age-related risk of cervical cancer, and the experience of women in obtaining cervical smears. Screening of predominantly young, relatively low-risk women results in a low yield and

consequent inefficiency. This inefficiency is compounded by poor success in following up women with abnormal smears.

To be effective, a screening programme should aim to maximise coverage through a systematic and efficient process, rather than increase the frequency of screening.[17] WHO recommendations for developing countries are to aim initially to screen every woman once in her lifetime at the age of about 40 years.[17] With greater resources the frequency of screening may be increased to once every 10 years, and then to once every 5 years for women between the ages of 35 and 55 years.[17]

The level of resources currently expended on screening in Khayelitsha indicates that services should aim initially to screen each woman once in her lifetime. This strategy's increased yield, through maximisation of coverage, will result in greater cost-effectiveness than the provision of repeat smears to a smaller number of women in order to improve the sensitivity of cytology screening. The distribution of age at presentation indicates that this screening should take place between 35 and 40 years of age. Measures to improve follow-up should be emphasised. The basic principles of primary health care (accessibility, acceptability, availability, affordability) should be applied in the quest to achieve maximum coverage, which is the first major target. Improved coverage of higher-risk groups has major implications for the organisation and provision of primary care services in similar settings throughout South Africa.

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