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Special Article

Does Screening for Cervical Cancer Affect Incidence and Mortality Trends?
The Belgian Experience

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Abstract—*Age-specific mortality and morbidity for cervical cancer from* 1956 *to* 1985 *in Belgium show a slight decline for women aged* 35–54, *and a constant rate for other age groups. Population screening as done in Belgium between* 1965 *and* 1980 *failed to have any impact on these trends, which could be due to poor organization of screening or changing risk factors for cervical cancer in the population.*

INTRODUCTION

THE RATIONALE for screening for cervical cancer is that early detection and treatment of carcinoma *in situ* will lead to a decline in mortality [1–4] and incidence of invasive cervical cancer [5].

As screening for cervical cancer was introduced in Belgium in 1965, it should be possible to assess the effect on mortality and incidence; firstly, by examining the trends to see whether they are real and not due to changing coding practices and, secondly, if the trends were real, by investigating if screening has had any effect on them, as claimed for the Nordic countries [5].

MORTALITY

Mortality data from cervical cancer were available from 1956 up to 1985 (with 2 years interruption) and have been obtained from the National Office for Health Statistics. These data are based on the death certificates [6] which are coded in the provincial medical offices, using the International Classification of Disease Code. From 1954 to 1958 the Sixth Revision was used, from 1959 to 1968 the Seventh, from 1969 to 1978 the Eighth and from 1979 to 1985 the Ninth.

Absolute mortality figures were age-standardized according to the direct method [7] and expressed in mortality per 10^5 women, aged 15 years and over (see Fig. 1).

This curve shows an initial decline up to the seventies where after mortality rises again slightly. Exact age-specific estimates of the percentage of women screened are not known, but it is generally accepted that women over 55 are less frequently screened than women aged 34–54 [8–10]. Therefore mortality was split into three categories: under 35 years, 35–54 and more than 55 (see Fig. 2).

INCIDENCE

ICD code was used with from 1969 on the Eighth Revision. Incidence data were studied from 1956 up to 1984, based on data collected by the Belgian

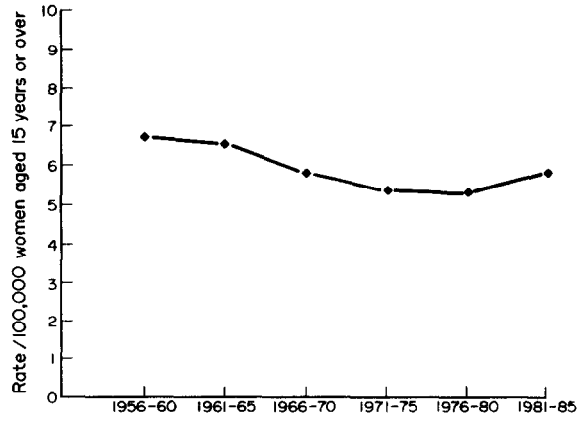

Fig. 1. Global death rate 1956–1985.

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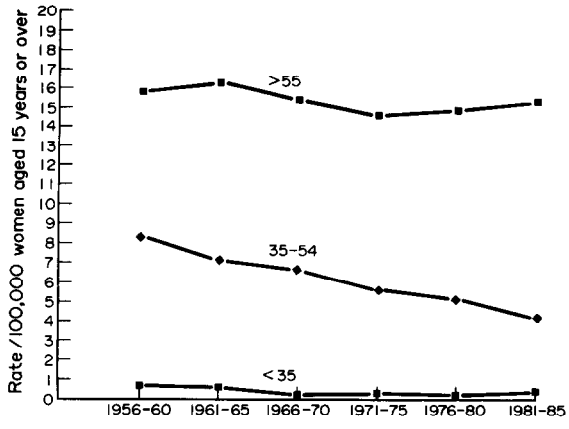

Fig. 2. Age-specific death rate 1956–1985.

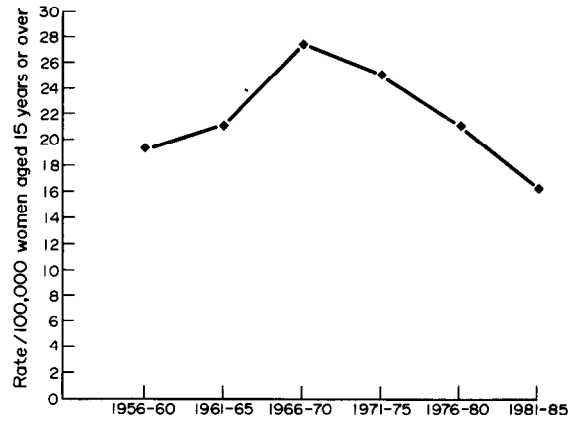

Fig. 3. Global incidence 1956–1985.

Work Against Cancer (BWK) on the basis of notifications by health insurance companies, hospitals and pathology laboratories.

Incidence was age-standardized according to the direct method [7] and expressed in rates per 10^5 women aged 15 years and older (see Fig. 3).

Most striking here is a sharp increase in incidence from 1961 onwards. The question arises if this is a real or an artificial increase. To study this problem, the number of unspecified uterine cancers is important. This is shown in Table 1. It is also important to note that numbers usually include carcinomata *in situ*.

The incidence for age groups 16–34 years, 35–54 and 55 and over is shown in Fig. 4.

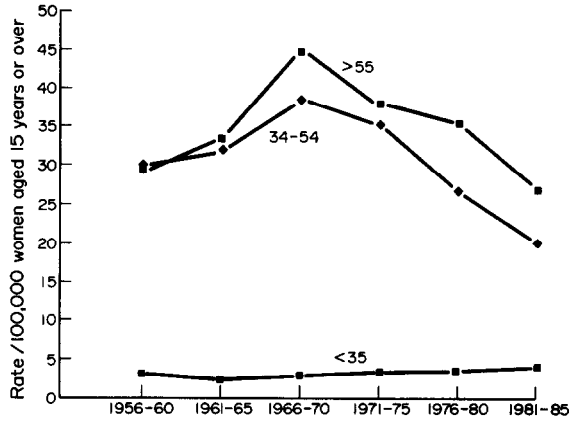

Fig. 4. Age-specific incidence 1956–1985.

Table 1. Mean yearly incidence of unspecified uterine cancer per 10^5 *women*

1956–1960	2.8
1961–1965	3.9
1966–1970	3.3
1971–1975	3.7
1976–1980	2.6
1981–1985	2.3

SCREENING

Early attempts in cervical screening in Belgium go back to 1959, when the "Centre de dépistage du cancer" was formed in Verviers. The purpose of this Centre was more case-finding than systematic screening [11].

In 1963, a working group of the Commission for the Study of Cancer submitted a report on early detection of cancer to the Minister of Health. This report discussed two options: individual case-finding or mass screening.

The following cancers were considered eligible for early detection:

(a) cancers of the genito-urinary tract, specifically in women
(b) cancer of the skin
(c) breast cancer
(d) ganglio-splenic tumours
(e) cancers of the thyroid.

The basis for these recommendations was clinical accessibility, rather than any epidemiological evidence for the value of such screening. No recommendations were given on how to invite people for screening or how frequently.

On the basis of this report, a Royal Decree (23 October 1965) provided criteria for subsidizing screening centres. Subsidies were partly fixed and partly depending on the number of examinations performed. Each centre—of which there was one per province—had to carry out individual and community-based screening; the target group was defined as all persons 21 years and over; but nothing was said about how to invite them and how often.

In practice, most centres organized screening programmes almost exclusively aimed at cervical

Table 2. Participation in the early cancer detection programme in Oost-Vlaanderen

Year	Number of women examined	Participation (%)
1965	4997	17.3
1966	8476	16.5
1967	12,066	14.1
1968	10,747	16.6
1969	10,961	13.4
1970	11,874	13.2
1971	14,135	16.0
1972	12,120	22.4
1973	14,624	16.4
1974	14,158	16.4
1975	11,645	16.9
1976	12,169	n.a.
1977	10,407	16.0
1978	11,996	17.8
1979	11,060	11.3
1980	12,100	n.a.
1981	13,338	10.6

n.a. = total number women invited not available.

cancer. Acceptance rates were never more than 20% of the population invited [12] (Table 2), and a survey done in the late seventies showed that only 12% of the total female population at risk had had a Pap smear taken in a centre during the last 5 years [13].

The total number of smears performed by the screening centres remained constant between 100,000 and 150,000 a year, while GPs and gynaecologists increased their screening activity to 1,000,000 smears a year in 1983 [14]. Theoretically, this number would be sufficient to screen the 3,000,000 eligible women in Belgium but it is not known which women are being screened.

The age-specific percentage of women having had a smear is only known from the 100,000 smears taken by the screening centres. This was 2.6% per year in the group under 35, 5.3% in the group 35–54 and 1.6% in the group older than 55 [15].

DISCUSSION

The effects of screening are not easy to analyse in non-randomized studies [16]. Yet it remains interesting to study the evolution of mortality and the incidence of the disease [17].

Mortality data can differ from the real situation because of errors on the death certificate both in over- and underreporting. Several studies estimate that the error of the group is around 5% [18–22]. A recent study, comparing accuracy of death certification of cervical cancer in the EEC, found a 15% error in Belgium compared to England and Wales. This error, however, was mostly due to the overcoding of unspecified uterine cancer. The ratio cervical cancer:unspecified uterine cancer in Belgium is constant, which suggests fairly constant coding practices [23].

Changes in the ICD Code did happen, but they did not influence the specific topic of cervical cancer. Large errors in the denominator are very unlikely because they are based on the decennial census. Changes in age distribution occured but are controlled for by age standardization. Changes in survival due to better treatment are considered to be very unlikely [24].

Incidence data have several drawbacks: inaccurate or incomplete reporting and inclusion of cases with premalignant conditions detected by screening.

The first reason for the increase from 1961 onwards could be inaccurate reporting. This can be evaluated by comparing the number of unspecified uterine cancers with the number of cervical cancers. This comparison shows that the accuracy of cancer registration was fairly constant in Belgium between 1956 and 1985.

Another possible explanation of the rising incidence from 1961 onwards is the so-called screening effect, i.e. finding more asymptomatic cancer cases with an unknown proportion of premalignant conditions with screening [25], especially if screening was directly offered on a large scale.

The reports of the screening centre of Ghent show that in the province of Oost-Vlaanderen (which can be considered as the catchment area of this Centre) screening was introduced gradually (28,000 women invited in 1965; 51,000 in 1966 and 85,000 in 1967 on a total of 300,000 at risk) with a mean acceptance rate of 16% [13].

Still another possible explanation of the rising incidence in the sixties is a more complete registration. From 1962 to 1967 the number of insured people in Belgium rose by 22.2% from 7,329,000 to 9,426,000 [26], possibly inflating numbers. This rise is more or less equal to the 30% increase of incidence of cervical carcinoma between 1962 and 1967. However, total cancer incidence for men and women and incidence of certain types of frequent cancer (bowel and stomach cancer) rose by 45% between 1962 and 1967 (cf. Table 3), showing that the rise in incidence from cervical cancer between 1962 and 1967 was less pronounced than the increase in total cancer incidence and probably not due to population screening.

Age-specific incidence could suggest that the incidence of cervical cancer in women aged 35–54 showed a peak just after the beginning of screening and subsequently a decline. But the increase between 1962 and 1967 was lower than the increase in incidence for both total cancer and some frequent cancers. From this it is concluded that this increase too was due to more complete registration. In

Table 3. Global and specific cancer incidence in Belgium (per 100,000 inhabitants) and increase

	Cervix (♀) ICD171	Bowel (♀) ICD152-153	Bowel (♂) ICD152-153	Stomach (♂) ICD151	Stomach (♀) ICD151
1962	19.6	10.6	9.0	16.3	9.8
1963	19.4	10.7	9.2	18.7	10.8
1964	22.8	15.7	12.0	21.9	14.6
1965	25.1	19.7	15.4	24.8	17.3
1966	28.2	20.4	16.1	27.6	17.3
1967	27.7	22.2	16.5	27.7	18.5
Percentage increase	29	52	46	41	47

	Global cancer incidence		
	♂	♀	Total
1962	145.8	149.6	147.7
1963	160.1	162.0	161.0
1064	195.1	202.8	199.0
1965	238.4	250.0	244.2
1966	261.8	279.2	270.5
1967	280.0	287.3	284.0
Percentage increase	48	48	48

fact, taking into consideration these restrictions, a downward trend in women aged 35–54 years is observed, already present before screening.

Can changes in incidence be explained by environmental factors, e.g. sexual habits? In Flanders the median age of first coitus dropped from 21.1 years for women born in 1931–1935 to 15.8 years for women born between 1956 and 1959 [27]. Although the role of sexual habits in the aetiology of cervical cancer is controversial and could not be demonstrated in the Netherlands [28], it is considered an important risk factor in most studies [29–31].

Smoking is another risk factor for cervical cancer [32]. In Flanders, the number of women who never smoked dropped from 91.6% in the cohort born before 1915 to 54% in the cohort born 1956–1965 [33]. Therefore, it is possible that the flat curve hides an increase, decapitated by screening.

In fact, mortality and incidence data for Belgium are very similar to Norway [34] and New Zealand [35] where unorganized screening took place too: a small decline in the middle-aged group, which started already before screening and constant figures in other age groups.

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