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Cervical cancer screening in Luxembourg

R. Scheiden [a,b,c,*], U. Knolle [a,b], C. Wagener [a], A.M. Wehenkel [c], C. Capesius [a,b,c]

[a] *Division of Clinical Cytology, National Health Laboratory, 1 rue Auguste Lumière, L-1950 Luxembourg*
[b] *Division of Pathology, National Health Laboratory, 1A rue Auguste Lumière, L-1950 Luxembourg*
[c] *Morphologic Tumour Registry, 4 rue Auguste Lumière, L-1950 Luxembourg*

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Abstract

In 1962, a programme for early detection of cervical cancer was established at the national level. The programme is based on the collaboration of different groups of doctors and not on a system of sending out invitations to every woman. This programme was re-adapted twice according to the needs for assuring quality in a system of mainly liberal medicine. At present the programme is 'institutionalised' and is carried out according to the criteria defined in 1990. This includes a centralisation of the smear readings and handing out the material needed to take the smears. The contribution of the doctors is regulated by a system of bonuses given by the government and a reimbursement by the Health Fund. The annual cervical smear is free of charge for every woman. The participation of the women targeted by the programme (> 15 years old) has increased by approximately 50% every decade from the early 1970s increasing from 10 950 in 1972 to 70 441 in 1999. Between 1980 and 1999, the number of women at risk taking part in the programme increased from 10.80 to 38.92%. The number of all the doctors taking smear samples increased from 68 to 105 and the number of gynaecologists increased from 19 (ratio Gyn/GP (gynaecologists/General Practitioners) of 28%) to 52 (ratio Gyn/GP of 50%). The mortality rate has decreased continuously from 6.1/100 000 in 1990 to 0.9/100 000 in 1997. In conclusion, to be successful, a cervical cancer screening programme should be flexible enough to allow short-term adaptations to unexpected local situations and needs a highly motivated team of the different participants involved in the regional and national health policy.

Keywords: Cervical cancer screening; Epidemiology; Population-based data; Quality assurance

1. Introduction and history

In 1962, Professor Pundel representing the Luxembourgish gynaecologists and pioneer in the domain of cervical cytology, together with Dr Dühr, Head of National Health Direction in the Ministry of Public Health established a national cervical cancer screening programme (NCCSP) in Luxembourg.

Starting in the early 1960s, this pilot project encountered a difficult period towards the end of the 1970s. This was due to the retirement of one doctor responsible for the reading of cervical smears. At this point a reorganisation of the national programme was inevitable.

In 1980, a division of clinical cytology was created within the National Health Laboratory (NHL) which had as its main aim the early detection of cervical cancer. From this moment, the reading of cervical smears was carried out by three cytotechnologists and two cytopathologists.

Besides the centralisation of free readings of cervical smears, the National Health Direction decided to pay a bonus equivalent to 1 euro for each smear to the doctor who took the sample. The National Health Fund allowed the gynaecologists to charge a supplement for a gynaecological consultation when a smear was taken. This means that all the women from 15 years of age onwards have one (or more if necessary) annual cervical smears that are free of charge.

A second adaptation of the programme was made in 1990 in anticipation of the new law regarding the National Health Fund and by considering the experiences of the last three decades. The new programme focuses on the standardisation of the reports, should assure a high quality of technical procedures and diagnosis and guarantee the rapidity at which reports are send out. The 'institutionalisation' of the national cancer screening programme (NCCSP) that was initiated in 1980 was 'finalised' in 1992 and now allowed free cervical

* Corresponding author. Tel.: +352-48-83-62; fax: +352-49-42-51.
E-mail address: pathologie@lns.etat.lu (R. Scheiden).

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examinations for every woman living in Luxembourg and who is older than 15 years of age.

The aim of the present report is to describe the evolution of the programme of early detection of cervical cancer in Luxembourg from 1962 to the present time and to document some of the results obtained during the 1980s and 1990s.

2. Population and methods

Since 1962, the Luxembourgish model has attempted to target women aged 15 years and over by using general practitioners (GPs) or gynaecologists as an intermediate. A sensitisation of women by sending out written invitations has not been taken into consideration. The smears of teenagers (15–19 years) are often sent to the laboratory by the 'Familial Planning Foundation' that provides free medical consultations in three different locations of the country (south, centre and north). The gynaecological examination and the cervical smears are free of charge.

By giving a bonus at the end of the year to the doctors sampling cervical material, the Ministry of Health can keep a record of exactly how many smears have been examined and how many women and doctors take part in the programme. It also allows the effectiveness of the programme to be judged and the assessment of possible changes that have to be made (advertisements in television, radio, press, etc.).

As part of the programme, the material needed to sample, transport and prepare the smears (spatula, cotton swab, flask for transport, ether-alcohol fixative, slides) is given to the doctors taking part in the programme. This allows a standardisation of the procedures and guarantees the quality of the material used. The sending out and returning of the smears is assured by the NHL which works together with the 10 main hospitals of the country.

Only one structured semi-public hospital with a group of gynaecologists working as employees exists in Luxembourg. All the other doctors work independently in a mainly liberal system. Two gynaecologists do not participate in the programme of early detection of cervical cancer and read the smears of their own patients. A third gynaecologist only sends his doubtful or positive cases to the National Health Laboratory for a second opinion.

3. Local organisation and screening practices

The cervical smears are accompanied by a 'form' containing the details of the patient and after interpreting the smear this makes up the final report. The name of the patient is written on the slide that arrives in the ether-alcohol fixative. For personal convenience a spray to fix the samples is used more and more frequently. Two office workers register and verify the administrative data in the national index, the so-called 'fichier national' (maiden name, first name, national identification number, address, name of the doctor who took the sample). They also look for the results of previous cervical examinations for comparison. Two assistant technicians are responsible for engraving the registration number on the slides. The slides are stained with Harris–Shorr and then put on trays and given to the cyto-technologists. At present, seven cytotechnologists examine a maximum of 76 smears (slides) per day. To guarantee the quality of the slide examinations, eight smears are chosen at random from a tray of different cytotechnologists and double-checked. The results of these eight control readings are noted separately. All the doubtful cases, those of poor quality and the cases with pathological alterations are looked at by the chief cytotechnologist and then given to one of the three cytopathologists responsible for the examinations of that day to give the final results. Since 1990, after the second re-organisation, the interpretation of the smears has been standardised and finalised after the Munich (II) classification, modified by Soost from 1989 (Table 1). The results are sent to the doctor in charge within 2–5 days, depending on the amount of work and availability of staff.

3.1. Quality assurance: state of the art in quality assurance at the national level

To ensure the quality of the programme (NCCSP), the cytopathologist can obtain daily information from the histopathology department of the NHL, where all the biopsies from the whole country are analysed for histological diagnosis. If the histological and cytological diagnoses are different (i.e. negative biopsy and positive cytology or vice versa) an immediate second examination of the histological section and the cytological slide will be carried out and a written report will be given on the representativeness of the sample or on any other possible cause for the wrong positive or negative results. These differences in results are registered by the Morphologic Tumour Registry (MTR) which is the equivalent of the national cancer registry. There is communication between the MTR and those who carry out the examinations if the results diverge.

After final cytological and/or histological diagnoses, all the false-positive or false-negative slides are reviewed by the responsible cytotechnologist and cytopathologist for quality assurance in the division of cytology. These cases are registered in a 'log book' and evaluated yearly.

3.2. Cervical cancer screening personnel

The recruitment of cytotechnologists is conducted via job advertisements among foreign candidates that have

Table 1
Munich classification (II), modified by Soost in 1989

Class	Cytological description	Recommendation
I	Normal cells	–
II	Regenerative cells, immature metaplastic cells, important degenerative or inflammatory changes, para- and hyperkeratinising cells. Normal endometrial cells even after the menopause.	Cytological control if necessary (with or without anti-inflammatory or hormonal treatment)
III	Important degenerative, iatrogenic or inflammatory changes of the cells where benignity or malignancy cannot be diagnosed with certainty, even if the smear is adequately prepared.	Short-term cytological control, if necessary after anti-inflammatory or hormonal treatment, or immediate histological control
IIID	Mild to moderate dysplasia (cervical intra-epithelial neoplasia CIN I and II)	Cytological control in 3 months
IIIG	Abnormal cells of the glandular epithelium whose carcinomatous nature can not be excluded with certainty; if possible with an indication of the endometrial, endocervical or extra-uterine origin of the cells.	Cytological or histological control
IVa	Severe dysplasia or carcinoma *in situ* (CINIII)	Histological control
IVb	Severe dysplasia or carcinoma *in situ*; invasive carcinoma not excluded.	Histological control
V	Invasive epidermoid carcinoma of the uterine cervix; adenocarcinoma, indicating if possible the endometrial, endocervical or extra-uterine origin of the cells. Other malignant tumours.	Histological control

done their training in their country of origin or among those who have obtained, as specified by law, a certificate of their 'examen de fin d'études secondaires'. Those candidates have to have completed a 2-year cytology training in the division of cytology. As there is no University in Luxembourg, doctors normally go abroad to one of the bordering countries to pursue their studies. The cytotechnologists and cytopathologists have to attend seminars organised by professional or scientific associations outside Luxembourg (i.e. international academy of cytology) in order to receive continuous training. The division of cytology covers the costs of this training.

3.3. Data collection

The doubtful or positive cases are entered into a database (ORACLE) which is connected to standard computer programmes like Microsoft Excel and Crystal Report. These data are then analysed and evaluated by the MTR.

4. Results

The statistical evaluation of the data given below (percentage of women taking part in the NCCSP) only takes into account the women at risk, excluding women 15 years of age or younger. The mortality rate (per 100 000) covers the whole Luxembourgish female population [1].

Table 2 shows an increase in the number of women (> 15 years) that had a cervical smear taken from 1962 to 1999. An increase in the number of examinations of approximately 50% per decade can be observed from the early 1970s.

Table 3 represents an analysis of the last two decades (1980–1989) and (1990–1999) showing a constant increase in the percentage of women who benefit from the NCCSP. The number increases from 16 577 in 1980 to 70 441 in 1999, a 4.25-fold increase. An increase in the ratio of gynaecologist/GP (28% in 1980 compared with 50% in 1999) with a 2.74-fold increase in the number of gynaecologists (19 in 1980 versus 52 in 1999) can also be observed.

Comparing the results of the two time-periods (1990–1994 versus 1995–1999) in relation to the number of women at risk (833 964 versus 884 947 females) we found an highly significant ($P < 0.001$) increase of the cytological diagnoses CI III (217 versus 1266 new cases) CI III (46 versus 215 new cases), CI IVa (460 versus 710 new cases) and a significant increase ($P < 0.05$) in the group CI IVb (30 versus 49). In the CI V-group are no significant changes (35 versus 36 new cases) [2].

At the same time the number of the cervical carcinomas *in situ* confirmed by histological examination increased from 379 to 555 new cases ($P < 0.01$), whereas the number of invasive cervical cancers decreased not significantly from 148 to 128 new cases [3–5].

5. Discussion

The evolution of the programme (NCCSP) with its adaptations is shown indirectly in Table 2. The reorganisation during the period 1962–1999 shows an increase of approximately 50% per decade from the 1970s in the number of women taking part in the pro-

Table 2
Number of women with a cytological cervix uteri examination from 1962 to 1999

1960:-	1970: 7488	1980: 16 577	1990: 41 694
1961:-	1971: 9264	1981: 15 815	1991: 42 326
1962: 251	1972: 10 950	1982: 17 059	1992: 47 825
1963: 1121	1973: 11 929	1983: 18 284	1993: 50 948
1964: 1526	1974: 14 508	1984: 20 767	1994: 58 305
1965: 1473	1975: 15 401	1985: 22 459	1995: 60 482
1966: 1452	1976: 14 825	1986: 27 024	1996: 62 467
1967: 2587	1977: 15 767	1987: 28 202	1997: 64 725
1968: 4399	1978: 16 780	1988: 32 432	1998: 67 596
1969: 5552	1979: 17 427	1989: 39 081	1999: 70 441

Table 3
Percentage of the female population (> 15 years) and percentage of gynaecologists participating in the national cervical cancer screening programme (NCCSP) period 1980–1999

Year	Number of women examined	Women at risk (target population) (%)	Number of doctors ratio Gyn/GP[a] (%) of gynaecologists	Year	Number of women examined	Women at risk (target population) (%)	Number of doctors ratio Gyn/GP[a] (%) of gynaecologists
1980	16 577	153 509 (10.80)	19/68 (28)	1990	41 694	163 315 (25.53)	36/112 (32)
1981	15 815	154 962 (10.21)	20/72 (28)	1991	42 326	164 909 (25.67)	36/112 (32)
1982	17 059	155 678 (10.96)	20/76 (26)	1992	47 825	166 595 (28.71)	40/110 (36)
1983	18 284	156 443 (11.69)	20/80 (25)	1993	50 948	168 570 (30.22)	41/111 (37)
1984	20 767	157 195 (13.21)	21/94 (22)	1994	58 305	170 575 (34.18)	43/110 (39)
1985	22 459	158 240 (14.19)	22/91 (24)	1995	60 482	173 071 (34.95)	44/108 (41)
1986	27 024	159 372 (16.96)	21/87 (24)	1996	62 467	175 081 (35.68)	48/107 (45)
1987	28 202	160 220 (17.60)	24/102 (24)	1997	64 725	177 008 (36.57)	48/102 (47)
1988	32 432	161 023 (20.14)	27/104 (26)	1998	67 596	178 805 (37.80)	49/96 (51)
1989	39 081	161 931 (24.13)	32/115 (28)	1999	70 441	180 982 (38.92)	52/105 (50)

[a] Ratio gynaecologists/General Practitioners.

gramme. The starting phase of the 1960s was followed by a consolidation phase in the 1970s. After the first re-organisation of the centre for early detection in 1980, a phase where the quality assurance (technique and organisation of the work of cytotechnologists and cytopathologists) predominated followed during the 1980s. A second re-organisation at the beginning of the 1990s with a standardisation of the diagnostic procedures and the internal control procedures has allowed a better evaluation of results. This is done in collaboration with two other national services, the division of pathology of the NHL and the MTR.

The important role gynaecologists play in making the programme a success is confirmed by the data in Table 3. Since 1992, a national mammography screening programme operates where invitations are sent to the group of women aged 50–64 years. It can be assumed that women will be sensitised indirectly by this campaign.

6. Conclusion

Even if the Luxembourgish model of a programme of early diagnosis of cervical cancer is old and does not rely on the principle of sending out invitations to every women in the target population. It appears that it has some advantages when it comes to flexibility due to the centralisation of the smear interpretation. Every change in quality, whether it concerns spatulas, fixatives, sampling or diagnosis can be detected and rectified in a minimal period of time. The administrative part of the programme (sending out and checking invitations) is reduced to a minimum. The direct collaboration of the three centralised departments (i.e. divisions of cytology and anatomical pathology and the MTR) allows an evaluation of the programme as a whole and/or an evaluation of each individual case *ad hoc*. What is more, the collaboration with other institutions such as the 'Planning Familial Foundation', the 'Foundation Against Cancer', and the Department of Preventive Medicine of the National Health Direction allows the doctors to sensitise the group of women targeted by the media. The decrease in the cervical cancer mortality rates from 19.0/100 000 in 1970 to 6.1/100 000 in 1990 and to 0.9/100 000 in 1997 has to be a good enough reason to be motivated and to continue putting effort into conserving the existing programme and trying to optimise the results while also being aware of the successful use of therapeutic treatments [6].

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