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Cervical cancer mortality trends in England and Poland

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ABSTRACT

Introduction: Age-standardised cervical cancer death rates in both Poland and England have been decreasing for many years, but without looking at rates within birth cohorts it is not clear whether these decreases are due to falling HPV rates or effective screening.

Material and methods: We compare the death rates within birth cohorts in both countries and reflect on the probable reasons behind these apparently parallel trends.

Results: Birth cohort analysis shows that the cervical cancer death-rate fell sharply in England after the introduction of the national screening programme in 1988. Before 1988 the rate had been rising rapidly in young women presumably due to rising prevalence of HPV, and without screening Britain would have had one of the highest rates of cervical cancer in the world. Mortality is lower in Poland than in England below age 35 due to lower HPV infection rates in young women but continues to rise steeply with age and is higher than in England above age 40, suggesting that screening has had much less impact on Polish mortality rates. In English women born since 1995 cervical cancer has now become very rare due to the highly successful school-based HPV vaccination programme which began in 2008, but vaccination coverage in Polish girls is estimated to be less than 15%.

Conclusions: The key to reducing mortality from cervical cancer in Poland is achieving high coverage for HPV vaccination in teenagers and for screening in unvaccinated women. Even a single sensitive HPV test has the potential to rapidly reduce the high mortality rate among older Polish women.

KEY WORDS: cervical cancer, mortality trends, screening, HPV vaccination, Poland, England & Wales.

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INTRODUCTION

In 2018 the World Health Organisation launched its cervical cancer elimination strategy with the aim of reducing the incidence rate below four per 100,000 women. Every country is encouraged to vaccinate at least 90% of girls, screen at least 70% of women twice in their lifetime with a high-performance test, treat 90% of pre-cancers and manage 90% of cervical cancers [1]. Age-standardised cervical cancer death rates in both Poland and England have been decreasing for many years (Figure 1), but without looking at rates within birth cohorts it is not clear whether these decreases are due to falling HPV rates or effective screening. Here we compare the death rates in both countries and reflect on the probable reasons behind these apparently parallel trends.

VACCINATION

HPV vaccination was introduced in both countries in 2008. In England, an organised school-based programme of free vaccination was initiated. All girls aged 12-13 were invited along with a catch-up for girls aged 14-17. A coverage of around 60% for at least one dose was achieved among the oldest girls [2], and coverage has been maintained above 80% for 12-13 girls [3]. Vaccina-

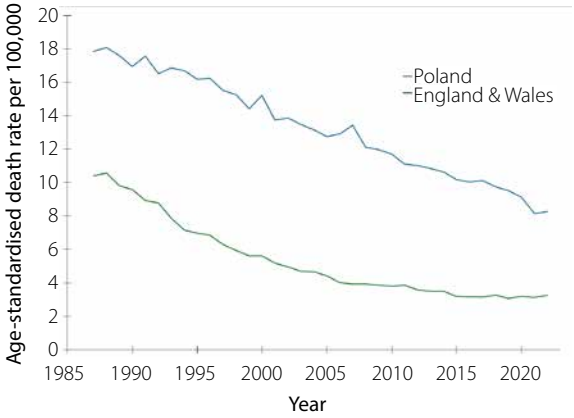

FIGURE 1. Age-standardised cervical cancer mortality rates for females aged ≥ 20 in Poland and England & Wales (1987-2022, using European standard population)

tion of boys was introduced in 2019 with slightly lower coverage. In Poland, vaccination has been administered in healthcare settings and was initially largely paid for by the recipient (around 30 EUR per dose) [4]. Local health services organised vaccination initiatives between 2008-2016, but coverage of these free services was estimated to be only 2% of 10-14 year old girls [5]. Overall coverage before 2022 was estimated to be 7.5-10.0% [4]. In June 2023 a national free vaccination programme was initiated for both girls and boys aged 9-14. Parents can arrange vaccination by booking an appointment at any primary care clinic. Coverage of the first dose from the first 3 months of the programme was 13.0% among girls and 6.7% among boys [6]. In September 2024 a free and voluntary school-based vaccination programme for Polish children (girls and boys) aged 9-14 was announced [7].

SCREENING

The English NHS Cervical Screening Programme was initiated in 1988. Women aged 20-64 (25-64 from 2004) were invited for 3 or 5 yearly screening with Pap smears before 2001 then with liquid-based cytology, and with primary HPV testing since 2019. Coverage has been close to 70% in most age groups [8].

In Poland an organised screening programme was funded between 2006-2016 to invite women aged 25-59 every 3 years for Pap testing [9]. Postal invitations were stopped in 2016 [10] and reported coverage rates seem inconsistent. 3-year coverage for women aged 20-69 years of 73% was reported by the 2019 European Health Interview Survey of 11,000 randomly selected households in Poland [11]. Even allowing for the 45% response rate this is substantially higher than the coverage of 24% reported in 2012 from data extracted from the National Coordinating Centre [9].

MATERIAL AND METHODS

Mortality rates in 5-year age-groups from 20-24 to 80-84 years with cervical cancer (ICD-10 C53) as the underlying cause were grouped into 5-year periods to calculate age-standardised rates (Figure 1) and age-specific rates in synthetic birth cohorts with central year of birth from 1912 to 1992 (Figure 2). The mortality rates are from 1953-57 to 2018-2022 for England and Wales (referred to as English rates for brevity) [12] and from 1973-1977 to 2018-2022 for Poland [13, 14].

RESULTS

MORTALITY RATES IN ENGLAND

Cohorts born before 1920 show the pattern typical of unscreened women worldwide [15] (Figure 2). Mortality rates increased to around age 50 and remained fairly constant after age 50, reflecting accumulating exposure to HPV infection to around age 45 after which new infections are rare. Figure 3 shows that rates in successive birth cohorts fell at all ages for women born from 1922-1932, presumably due to declining rates of HPV infec-

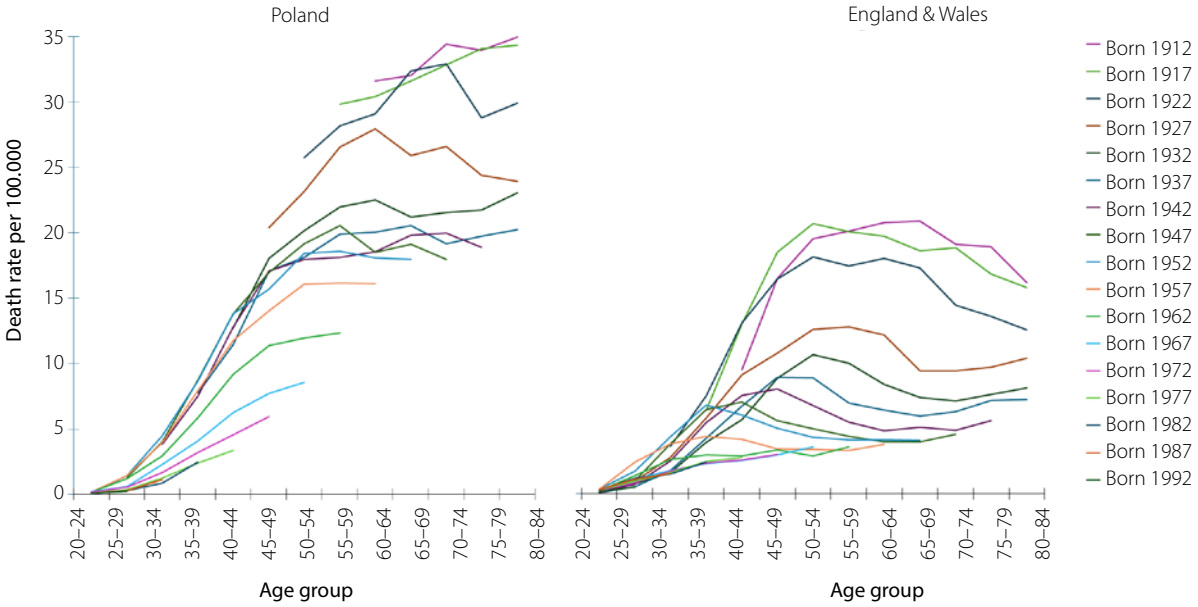

FIGURE 2. Cervical cancer mortality rates by birth cohort (Poland 1973-2022, and England & Wales 1953-2022)

tion. However, death-rates below age 35 then increased sharply among women born in the 1940s and 1950s due to the "sexual revolution" of the 1960s, and the UK was on the verge of an unprecedented rise in cervical cancer which would have resulted in one of the highest rates in the world [16]. The launch of the organised national screening programme in 1988 immediately halted the increase with increasing age, and mortality rates began to fall in each birth cohort (Figure 3).

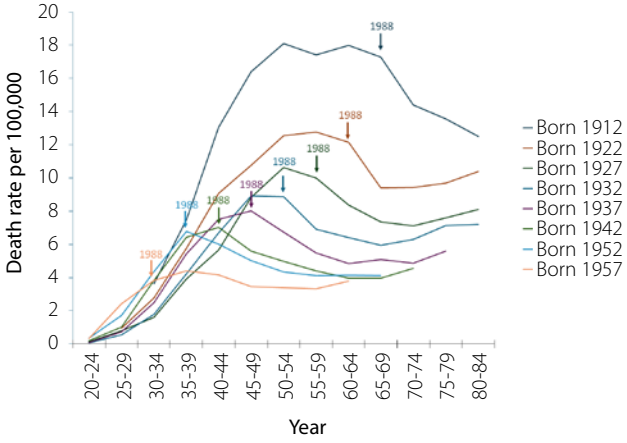

FIGURE 3. Cervical cancer death rates by birth cohort for women born 1922-1957 (England and Wales, 1953-2022). Arrows indicate start of organised national screening in 1988

MORTALITY RATES IN POLAND

The pattern in Poland is the opposite of that seen in England (Figure 2). Cervical cancer mortality below age 35 decreased steadily in Poland in successive cohorts born from 1952 to 1982, presumably due mainly to a continuing reduction in HPV prevalence. However, the rates in each birth cohort continued to rise with age to around age 50 and then plateau, similar to the characteristic pattern among unscreened women.

RISK FACTORS IN ENGLAND AND POLAND

An epidemiological study of 834 women in Warsaw [17] showed a lower number of lifetime sexual partners and later age at sexual debut than a contemporary study conducted in Manchester, England [18]. 70% of Polish women reported 1-3 lifetime sexual partners compared to 47% of English women, and 36% of English women reported 6 or more lifetime partners (Table 1). HPV prevalence among women aged under 25 was 33.4% in England and 13.5% in Poland, 18% in both countries among women aged 25-34, and slightly higher in Poland among women over 35 years (Table 1) [17, 19].

RECENT TRENDS

Figure 4 compares Polish and English mortality rates in women born in 1977, 1982 and 1987. The Polish rates are a quarter of the English rates below age 30, reflecting much higher HPV prevalence in young women and earlier age of sexual debut in England (Table 1), but by age 35-39 the rates have converged and by age 40-44

TABLE 1. HPV prevalence and sexual risk factors among women in Warsaw, Poland and Manchester, England

	Warsaw, Poland[1]		Manchester, England[2]	
	hrHPV prevalence (%)		hrHPV prevalence (%)	
Age group				
18-24	13.5		33.4	
25-34	18.0		18.0	
35-44	11.5		7.0	
45-54	6.5		3.8	
55-59	3.0		2.6	
	n	%	*n*	%
Age at sexual debut				
< 17	79	9.6	212	32.2
17-19	396	48.0	301	45.7
≥ 20	350	42.4	145	22.0
Number of lifetime sexual partners				
1	299	36.2	152	23.0
2-3	279	33.7	156	23.6
4-5	147	17.8	115	17.4
≥ 6	102	12.3	237	35.9

[1]HPV prevalences taken from Figure 1 in Bardin et al. [17]. Survey conducted in 2006 among 834 women aged 18-59 in Warsaw.
[2]HPV prevalence at entry to the ARTISTIC trial in 2001-2003 among 23,255 women aged 20-59 [19]. Age at sexual debut and number of lifetime sexual partners among a survey of 660 ARTISTIC participants conducted in 2006, adapted from Almonte et al. [18].

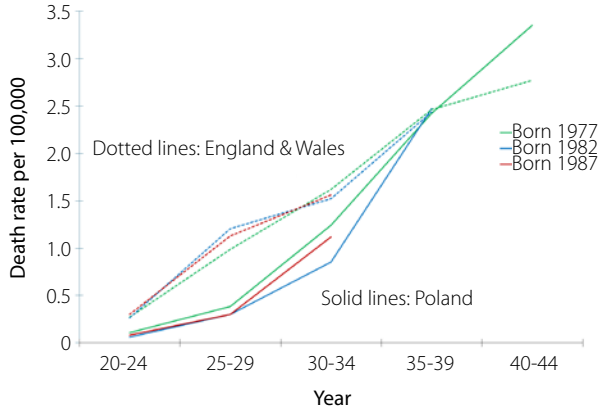

FIGURE 4. Cervical cancer mortality rates for women born in the birth cohorts centred in 1977, 1982 and 1987, for Poland (solid lines) and England & Wales (dotted lines)

the Polish rates are higher. This suggests that screening has been much less effective in Poland, and that unless it improves the mortality rate in young women will continue to rise up to age 50 as it did in the earlier birth cohorts shown in Figure 2.

DISCUSSION

Our main conclusion is that the reasons for the decline in overall cervical cancer mortality in England and Poland (Figure 1) are very different. In England the national screening programme reversed the rapid increase in mortality from the low risk in women born in the 1930s to those born since the 1960s caused by increasing HPV prevalence and earlier age at sexual debut. Trends in Polish mortality rates suggest that the reduction in mortality was caused mainly by a continuing reduction in HPV prevalence, and that screening had less effect. Screening must have made some contribution to the roughly 5-fold decline in mortality in Polish women at each age from those born in 1922 to those born since 1977 shown in Figure 2. However, there is no evidence of the decline with increasing age seen in English birth cohorts after the introduction of national screening in 1988. The more conservative sexual behaviour among Polish women [17] is reflected in their lower HPV rates (Table 1) and lower cervical cancer mortality below age 35 (Figure 4), but without better screening coverage the mortality rate is likely to continue to increase in each birth cohort before plateauing around age 50.

Cervical screening has a larger effect on mortality than on incidence because most screen-detected cancers are diagnosed at stage 1 or 2. The five-year net survival for cervical cancer at all ages was estimated to be 55.1% in Poland and 63.8% in the UK in 2010-2014 [20], and the crude incidence : mortality ratio among women of screening age (25-59) is 2.8 in Poland and 4.4 in the UK [21].

HPV prevalence among English women is likely to have been high since the 1960s, and without screening this would have resulted in one of the highest cervical cancer rates in the world. This public health disaster was avoided by the introduction of organised screening in 1988. We estimated from an age-period birth cohort analysis that the organised screening programme prevented around 5,000 future deaths annually [16]. The rapid effect on English mortality rates after 1988 suggests that a single screen can have a substantial effect on mortality. If Poland were to introduce HPV testing, which is a much more sensitive test than the Pap testing introduced in England in 1988 [22], just one round of screening, particularly among older women, would have the potential to save many lives. It would be worth offering a single HPV test to women up to age 70 (as done in Australia). Women older than age 40 who test negative for HPV have a very low lifelong risk of cervical cancer [23], so clinical resources could then be focussed on follow-up and treatment of the HPV positive minority.

Prior to recommending a switch to primary HPV testing, most governments in Europe have initiated evaluation trials or pilot projects. The HIPPO trial is currently randomising 33,000 Polish women to receive primary HPV testing or the standard Pap testing. Various methods for triaging HPV positive women are being evaluated as part of the trial protocol [10]. Triage strategies have been shown to be too conservative in countries such as in England where all HPV positive women with abnormal cytology are referred to colposcopy immediately. Only 0.035% of those referred following borderline or low-grade cytology were diagnosed with invasive cancer [24, 25]. The pilot study of HPV testing in England showed an increased detection of precancer and cancer in the HPV arm followed by a much lower incidence in the second round of screening [26, 27]. The increased sensitivity of HPV testing means that those testing negative have a longer period of protection and screening intervals can be extended among those testing negative.

English women born from the 1960s onwards were screened from age 20 (then from age 25 for those born since 1984) and have low mortality rates. A dramatic further reduction was seen among women born since 1995 who were vaccinated at school at age 12-13. Death from cervical cancer will become a rare event among these birth cohorts, as over 80% were vaccinated against the two oncogenic HPV types (16 and 18) which are estimated to cause 70-80% of cervical cancers in England [28]. Cervical cancer will be virtually eliminated among birth cohorts born since 2007 who were vaccinated against 7 oncogenic HPV genotypes [29, 30].

Vaccination coverage ranges from about 10% to 90% in high income countries, with very few achieving over 80% for at least 1 dose, and only Norway, Iceland, Chile and Portugal achieving over 90% [31]. Norway, Iceland and Chile administer the vaccine via school-based programmes but Portugal has achieved this coverage through health centres alone [32], probably due to

a culture of high adherence to childhood vaccination in addition to a comprehensive monitoring system [33]. In the absence of a school-based programme, strategies for increasing coverage should be employed. Text message reminders issued to parents increased the participation rate from 12% to 23% in Los Angeles [34].

The free and voluntary school-based vaccination programme for Polish children aged 9-14 announced in September 2024 is an extremely important step but it will not benefit women born before 2010. Regular national screening with high coverage cannot be implemented immediately, but a single HPV test for older Polish women could save tens of thousands of lives.

CONCLUSIONS

England is close achieving the WHO targets for both vaccination (90% of girls) and screening (at least 70% of women twice in their lifetime). In 2023 83.3% of girls aged 15-16 years had received the HPV vaccine, and screening coverage, though lower than pre-pandemic levels, was 69%. Poland is a long way from the targets, with an estimated vaccination coverage of less than 15% and screening coverage of ~25%. The key to reducing mortality from cervical cancer in Poland is achieving high coverage for vaccination among children and for screening among unvaccinated women. Even a single screen using a sensitive HPV test among unscreened older women has the potential to significantly reduce cervical cancer mortality.

DISCLOSURE

The authors report no conflict of interest.

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AUTHORS' CONTRIBUTIONS

CG prepared research concept of the publication. KJK, CG collected data. CG, JP analysed data. All authors took part in preparing the final text of the publication.