

Trends in peptic ulcer mortality in Italy, 1955-1985

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Abstract

Study objective—The aim was to analyse trends in mortality from peptic ulcer in Italy between 1955 and 1985, disentangling the role of age, cohort of birth, and period of death.

Design—This was a descriptive epidemiological survey. Death certification numbers from peptic ulcer and estimates of the resident population were obtained from official sources. From these data, age specific and age standardised mortality rates from peptic ulcer were computed. A log-linear age, period, and cohort model with arbitrary constraints on the parameters was applied to the matrices of age specific rates between 25 and 74 years of age.

Setting—This was a national survey.

Main results—For males, overall peptic ulcer mortality was constant or moderately upwards (from 9.0 to 9.4/100 000, on the basis of World Standard Population) from 1955 to the mid-1970s, but declined considerably afterwards to 3.7/100 000 in 1985. Truncated (35-64 years) rates were slightly more favourable, even in earlier calendar periods, but a substantial drop was observed only from the late 1970s onwards. In 1985 the standardised rate was 3.3/100 000 compared to 18.3 in 1955-1959. For females, the time pattern was similar, although the extent of the decline was smaller in absolute terms (from 1.6 to 1.2/100 000, all ages; from 2.3 to 0.7, truncated). Age specific rates showed an earlier decline in the young, while the fall started only after the mid-1970s in older age groups. On the basis of a log-linear age, period, and cohort model, the Italian generations born in the first decade of this century had the highest risk of dying from peptic ulcer, with a substantial decline for each subsequent cohort. Period trends were stable between 1955 and the mid-1970s, but declined appreciably afterwards.

Conclusions—In Italy the peak rate of peptic ulcer mortality was observed in the early 1970s, with a delay of around two decades in comparison with northern Europe and the USA. This can be related to the later process of industrialisation in Italy, with the consequent changes in lifestyle habits, and to a later pattern of rise and decline of cigarette smoking. A likely explanation of the falls in mortality on a period of death basis over the last decade is the introduction of new drugs (histamine-2 receptor antagonists) for the treatment of peptic ulcer, with a reduction of com-

plications of the disease and related mortality. This decline in mortality from peptic ulcer corresponds to the avoidance of over 1500 deaths per year in the whole of Italy.

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In the first half of the current century, the incidence of and mortality from peptic ulcer systematically tended to rise in most Western countries.^{1 2} Some of these upward trends reflect improved or changed criteria for diagnosis and certification, but the extent of the rises suggests that they were probably real, at least to some extent.

After a peak around the middle of the century, however, ulcer rates started to decline.² In the USA both hospital admissions and death rates have fallen.³⁻⁶ Similar trends have been observed in England and Wales,⁷ Ireland,⁸ (west) Germany,⁹ and Denmark.¹⁰

However, peptic ulcer remains an important public health problem; it has been estimated that 5-10% of the population is at risk of developing this disease during their lifetime, with substantial social and economic losses.⁶ In the USA the prevalence rate in 1975 was 1.7%⁶ and declined to 1.6% in 1980.¹¹ Published prevalence estimates in other populations were 5.8% in Finland,⁶ 6.5% in males and 2.8% in females in Italy,¹² 9.9% in Scotland, 5.2% in England, 7.2% in Australia,¹³ and up to 23% in male factory workers in Japan.¹⁴ Although part of these apparent differences is probably due to different selection or data collection criteria, some of the variation is probably real. This is confirmed by the fact that while in some countries both incidence and mortality rates have declined, in others death rates have declined, but not incidence rates (eg, in Denmark).^{15 16}

Since no systematic analysis of Italian trends in peptic ulcer is available, this article presents an overview of death rates from peptic ulcer in Italy from 1955 and 1985 using age specific, age standardised rates and a log-linear age, cohort, and period model.

Methods

Death certification numbers from peptic ulcer, stratified by sex and age in five year groups, were derived from official publications by the Italian Central Institute of Statistics (ISTAT).¹⁷

Over the calendar period considered, three different revisions of the *International classification of diseases* (ICD) were in use: the seventh up to 1967, the eighth from 1968 to 1978, and the ninth from 1979 onwards. Classification of peptic ulcer deaths was recoded according to the ninth

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revision of the ICD. Gastric ulcer (ICD 540 in the seventh revision, ICD 530 in the eighth and ninth), duodenal ulcer (ICD 541 in the seventh revision, ICD 531 in the eighth and ninth), gastrojejunal ulcer (ICD 542 in the seventh revision, ICD 532 in the eighth and ninth), and peptic ulcer of unspecified site (ICD 533 in the eighth and ninth revisions) were grouped together on account of difficulties in the interpretation and potential changes in classification and death certification reliability. Gastrojejunal ulcer accounted for less than 1% of all ulcer deaths and "peptic ulcer of unspecified sites" was not present in the seventh revision.

Estimates of resident population were published by the Department of Demography of the University of Rome,¹⁸ for the period 1952–1972, then by the Italian Central Institute of Statistics from 1972 onwards.¹⁹ From these data, age specific death certification rates for each five year calendar period (plus 1985 alone) and age group (from 25–29 to 75–79 years) were derived.

Age standardised rates were computed using 1971 Italian census population, and, for international comparisons, the World Standard Population (WD). Truncated 35–64 year rates were standardised on the basis of the World Truncated Population (the structure of which is very similar to that of the Italian population in the same age groups).²⁰

Further, an age, period, and cohort model with arbitrary constraints on the parameters was applied to the matrices of age specific rates between 25 and 74 years. For model computation, deaths among people aged over 75 years were not

considered, since death certification is known to be less accurate at older ages. Cohorts were defined according to the central year of birth. For instance, the earliest possible cohort considered (the 1885 cohort) relates to persons aged 70 to 74 years who died in the quinquennium 1955–1959: they could have been born in any of 10 years from 1880 to 1889, inclusive.

The methods were derived from those proposed by Osmond and Gardner,²¹ and have been described previously.²² Briefly, from the matrices of age specific rates for each five year calendar period and age group, the effect of age, birth cohort, and period of death was evaluated through a log-linear Poisson model, fitted using the generalised linear interactive modelling (GLIM) procedure²² with appropriate user supplied macros.

In simplified terms, the estimates presented are derived from the model including the three factors (age/cohort/period) which minimizes the sum of the Euclidean distances from the three possible two factor models (age/period; age/cohort; period/cohort). Cohort and period of death values were averaged to unity; the age values are interpretable in terms of mean age specific death rates in the period considered. Cohort values related to earlier and more recent periods are based on fewer age specific rates (eg, only one for the 1885 cohort, two for 1890, etc) and hence are less stable and reliable than central ones.

Results

Figure 1 gives trends in age standardised death certification rates from all peptic ulcers in Italy from 1955 to 1985. For males, overall rates were constant or moderately upwards (from 9.0 to 9.4/100 000, on the basis of World Standard Population) up the mid-1970s, but declined considerably afterwards to 3.7/100 000 in 1985. Truncated (35–64 years) rates were slightly more favourable even in earlier calendar periods, but a substantial drop was observed only from the late 1970s onwards. In 1985 the standardised rate was 3.3/100 000 compared to 18.3 in 1955–1959. For females, the time pattern was similar in qualitative terms, although the extent of the decline was smaller in absolute terms (from 1.6 to 1.2/100 000, all ages; from 2.3 to 0.7, truncated). Still, in 1985 over 1600 deaths were attributed to peptic ulcer in Italian males and over 850 in females.

The male/female ratio was 5.6 in the 1955–1959 and declined to 3.5 in 1980–1984 and to 3.1 in 1985. Thus the decline in mortality from peptic ulcer was sharper for males than females.

Inspection of age specific rates (table I for males, table II for females) gives important additional information. For males below age 60 years and females below age 70 years the pattern was in fact already downwards in earlier periods, although the decline became steeper from the mid-1970s onwards. In older age groups, in contrast, rates were substantially upwards between the mid-1950s and the mid-1970s, and only started to decline thereafter.

The presence of both a period and a cohort effect in mortality from peptic ulcer clearly emerges from the estimates of the log-linear age,

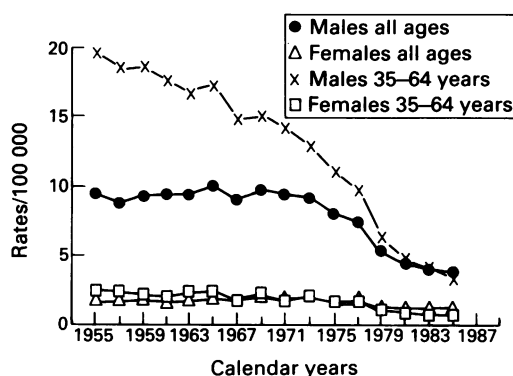


Figure 1 Trends in age standardised* death certification rates from peptic ulcer. Italy, 1955–1985.

* On the basis of the World Standard Population

Table I Death certification rates/100 000 males from peptic ulcer. Italy, 1955–1985.

Age (years)	Calendar years						
	1955–59	60–64	65–69	70–74	75–79	80–84	1985
	Age specific rates						
25–29	3.3	2.1	1.5	1.0	0.5	0.2	0.0
30–34	5.3	4.1	2.4	1.7	0.9	0.4	0.3
35–39	8.0	6.5	4.8	3.5	1.6	0.8	0.5
40–44	9.9	9.8	7.8	5.6	3.3	1.5	1.2
45–49	15.5	13.1	11.9	9.9	6.5	2.8	2.1
50–54	22.8	19.9	16.9	15.3	9.6	4.3	3.2
55–59	30.9	27.7	24.2	22.5	15.8	7.7	5.6
60–64	32.8	37.3	37.3	32.4	23.2	12.9	10.0
65–69	32.1	44.0	48.9	47.8	36.0	19.4	16.9
70–74	39.5	48.9	63.6	68.7	54.5	33.1	28.8
75–79	41.9	58.0	73.3	90.6	79.4	55.4	51.7
	Crude rates						
Total (all ages)	9.9	10.9	11.4	11.8	9.5	6.1	5.8
	Age standardised rates ^a						
Total (all ages)	11.0	11.7	11.8	11.7	8.9	5.4	4.9
Number of deaths	11 914	13 514	14 685	15 689	13 008	8437	1613

^a On the basis of the 1971 Italian population.

period, and cohort model (fig 2 for males, fig 3 for females). Cohorts born toward the end of the last century had low values which, however, may be partially or largely due to changes in diagnosis and certification accuracy for the elderly in the past. The worst affected generations were that of 1905 for males and of 1900 for females. Substantial declines were observed for each subsequent cohort and the risk of dying from peptic ulcer for

males born in 1955 was only 7% compared to those born in 1905 (and 20% for females).

When allowance was made, in the log-linear model, for age and cohort effects, period trends were stable between 1955 and the mid-1970s, but declined appreciably afterwards. These period effects, moreover, are probably underestimated by the model, which tends to overestimate the factor with the largest number of points (ie, the cohort one).²³

Table II Death certification rates/100 000 females from peptic ulcer. Italy, 1955–1985.

Age (years)	Calendar years						
	1955–59	60–64	65–69	70–74	75–79	80–84	1985
	Age specific rates						
25–29	0.4	0.3	0.2	0.2	0.1	0.1	0.0
30–34	0.5	0.4	0.3	0.3	0.2	0.1	0.1
35–39	0.7	0.6	0.5	0.5	0.3	0.2	0.2
40–44	1.2	1.1	0.8	0.8	0.5	0.3	0.3
45–49	1.7	1.5	1.8	1.2	0.9	0.5	0.6
50–54	2.6	2.5	2.3	2.2	1.5	0.8	0.7
55–59	3.6	4.0	3.5	3.6	2.5	1.3	1.2
60–64	5.5	5.6	5.0	5.1	4.3	2.6	1.6
65–69	8.5	8.6	8.7	8.6	7.3	4.3	4.3
70–74	10.9	12.2	15.6	15.0	12.1	9.2	9.7
75–79	16.3	16.7	21.4	26.4	23.6	17.9	16.9
80+	17.8	24.8	34.8	42.2	42.3	41.1	48.0
	Crude rates						
Total (all ages)	2.1	2.4	2.9	3.3	3.2	2.7	3.0
	Age standardised rates ^a						
Total (all ages)	2.5	2.7	3.1	3.3	2.8	2.2	2.3
Number of deaths	2588	3076	3860	4628	4537	3936	885

^a On the basis of the 1971 Italian population.

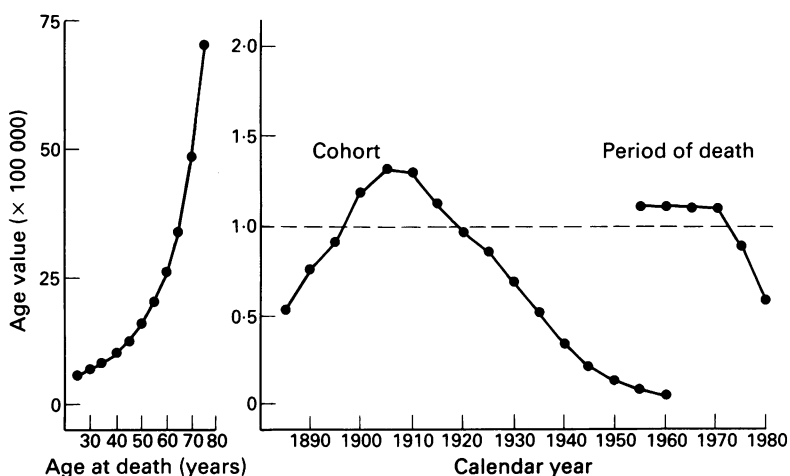


Figure 2 Age, birth cohort, and period of death effects in peptic ulcer mortality, males. Italy, 1955–1985.

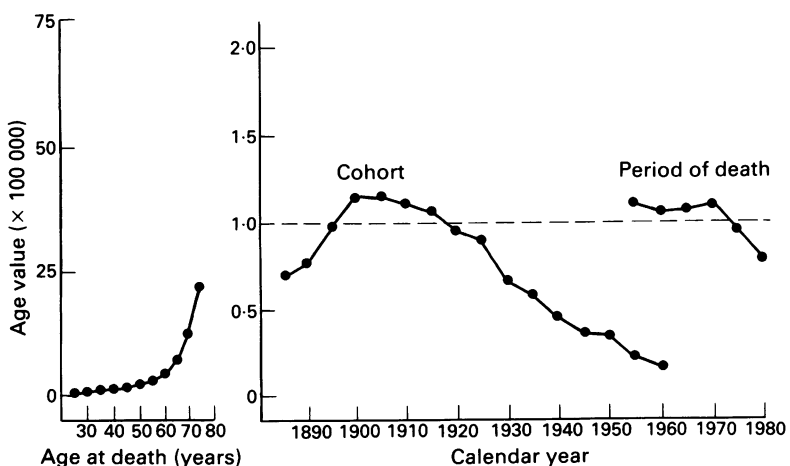


Figure 3 Age, birth cohort, and period of death effects in peptic ulcer mortality, females. Italy, 1955–1985.

Discussion

There are at least three relevant findings in this overview of trends in peptic ulcer mortality in Italy over the last three decades: (1) overall age standardised rates were stable or moderately upwards for both sexes up to the mid-1970s, but declined appreciably over more recent calendar periods; (2) cohort effects were superimposed on period trends, since rates have been declining earlier in the young, but started to fall only after the mid-1970s in the older age groups; (3) peptic ulcer shows an important decline in all age groups from the mid-1970s onwards.

In Italy, the peak rate of peptic ulcer mortality was at the beginning of the 1970s, while in other western European countries^{1 2} and in the USA⁶ the peak was in the second half of the 1950s. The cohort effect in Italy was similarly delayed, since the highest peptic ulcer mortality was observed for generations born in the first decade of this century, while in England and Wales,²⁴ Switzerland,²⁵ and the USA,^{9 26 27} the cohorts born in the last quarter of the 19th century were exposed to a maximum risk of death from peptic ulcer. This difference may be essentially due to the later process of industrialisation in Italy, with its consequent changes in lifestyle habits.

More specifically, well established risk factors for ulcer, such as cigarette smoking, had a delayed pattern of rise and decrease in Italy as compared to Northern Europe and America. In the USA, per capita cigarette consumption has declined since the early 1960s, while in Italy steady rises have been observed up to the early 1980s, with a delay of about two decades in the changing patterns of smoking compared to American trends.²⁸ In young and middle aged Italian males, in fact, reported smoking prevalence remained comparatively high (between 55% and 60%) until the early 1980s, and tended to decline during the later 1980s, reaching 50% in the age group 25–44 years in 1986–1987. In females, smoking prevalence was low (ie, less than 10%) until the late 1960s and increased thereafter, reaching 18% in the mid-1980s (and 25–30% in young adults and early middle age).^{29–31} In late middle and older age, the downward trends in smoking prevalence were also moderate and in 1986–1987 current smokers were still 41% of males aged 55 to 64 years and 31% of those aged 65 to 74 years.³¹

A further major finding of this study is the decline in peptic ulcer mortality, starting from the second half of the 1970s. A likely explanation of this effect may be the introduction of histamine-2 (H₂) receptor antagonists, which were introduced in Italy in the late 1970s. These new drug treatments probably accelerated the underlying pattern of decline in mortality, appreciably

reducing the complications of the disease (essentially perforation and haemorrhage) and the consequent need for surgical procedures and related mortality.³²⁻³⁴

Thus the present descriptive study presents a useful contribution to quantification of the public health impact of the fall in peptic ulcer mortality, and particularly of the role of H₂ receptor antagonists. This can be estimated in a reduction of over 1500 deaths per year in the whole of Italy in 1985 as compared to the rates observed one or two decades earlier.

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