RELATIVE INCIDENCE OF GASTRIC AND DUODENAL ULCERS

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The relative incidence of gastric and duodenal ulcers is a subject about which there is some divergence of opinion. Before the war, owing to the absence of any national morbidity statistics, the only sources of information were records of individual hospitals and the Registrar-General's returns of deaths. During the war a study was made of the causes of admission to E.M.S. hospitals, thus providing a rather larger and more uniform, though admittedly biased, set of data. The Survey of Sickness was also begun, involving sampling over the national field, though the data may be open to question as depending on the memory of the person interviewed and his statement of diagnosis. Both death returns and hospital studies showed a preponderance of gastric over duodenal ulcers, yet it was a commonly held opinion that the proportion of duodenal to gastric ulcers was five to one or possibly higher.

The Registrar-General's returns distinguish duodenal ulcer from ulcer of the stomach. The latter term includes, in the *International List of Causes of Death*, the somewhat vague term "peptic ulcer," but where a certificate bears this term inquiry is made regarding the exact site, so that only those ulcers whose site is not known are left in this group. The numbers of deaths in England and Wales for the periods 1929-38 and 1939-47 are shown in Table I.

TABLE I.—Deaths from Ulcers of Stomach and Duodenum, 1929-47

	No. of Deaths				Average Annual Deaths†			
	1929-38		1939-47*		1929-38		1939-47	
	M.	F.	M.	F.	M.	F.	M.	F.
Duodenal ulcer	11,644	2,034	14,149	2,243	1,164	203	1,540	249
Ulcer of stomach	21,109	8,391	22,080	7,398	2,111	839	2,413	822
Ratio D.U./G.U.	0.55	0.24	0.64	0.30				

* Including non-civilians. † Non-civilians only.

In the earlier period duodenal ulcers formed 36% of all ulcer deaths among males, and in the latter period, 39%. There is a significant difference between these percentages (difference = 3.47; 2 S.E. = 0.74). In the case of female deaths, duodenal ulcers accounted for 20% and 23% of all ulcer deaths, showing also significant difference between the two periods (difference = 3.76; 2 S.E. = 1.16). Among non-civilian males there were 361 deaths from gastric ulcer and 292 from duodenal ulcer during 1939-47. Excluding non-civilians on the grounds that Service men may be subject to conditions of strain which would tend to produce a high incidence rate of duodenal ulcer, and comparing the average annual deaths in the two periods, duodenal ulcers showed an increase of 32% compared with 14% for gastric ulcers among males, while female deaths showed corresponding changes of +23% and -2%. New rules for assignment in cases of death from joint causes were in force from 1939 onwards. If correction factors be applied to the death figures for 1929-38 to make them comparable with those for 1939-47, the corresponding increases or decreases in the average annual deaths would be: males, duodenal ulcer +30%, gastric

ulcer +12%; females, duodenal ulcer +20%, gastric ulcer -5%.

The percentage increases or decreases in male deaths from ulcers in various age groups are shown in Table II.

TABLE II.—Average Annual Deaths from Gastric and Duodenal Ulcers, 1929-38 and 1939-47. Males

	1929-38	1939-47		Increase per cent.			
		Civilians Only	All	Civilians Only		All	
Ulcer of stomach					*		*
Ages 15-54 ..	1,068	905	944	-15.4	-17.4	-11.6	-13.8
" 55-64 ..	573	768	771	+34.2	+31.1	+34.6	+31.6
" 65 up ..	466	736	736	+56.4	+54.6	+56.4	+54.6
Duodenal ulcer							
Ages 15-34 ..	118	82	97	-30.5	-31.7	-17.8	-19.2
" 35-54 ..	484	556	572	+14.9	+12.3	+18.2	+15.6
" 55 up ..	562	896	897	+59.4	+56.4	+59.6	+56.5

* Based on figures for 1929-38 to which correction factors have been applied.

Whether all males are considered, or only civilians, the average annual deaths from gastric ulcer in 1939-47 were fewer than in 1929-38 in all the five-yearly age groups from 15 to 54, the overall decrease for these ages being more than 10%. From 55 upwards each quinquennial age group showed an excess in the second period, the increase at ages 55-64 being 34%, and at 65 and over 56%. The average annual deaths from duodenal ulcer were fewer in each five-yearly age group from 15 to 34, the decrease being 31% in the case of civilians only and 18% if non-civilian deaths are included. At ages 35-54 the rate was 18% higher in the second period, and at ages 55 and upwards 60%. The striking increase in deaths from both types of ulcer in the higher age groups is out of all proportion to the alteration in the age structure of the population. The effect of applying conversion ratios to the figures for 1929-38 is to reduce the increases by 2 or 3%.

In a one-fifth sample of male Service patients admitted to E.M.S. hospitals as in-patients during 1940-7 there were 1,395 cases of gastric, 5,199 of duodenal, and 387 of peptic ulcer. Hence there were 3.7 times as many admissions for duodenal as for gastric ulcer, while the ratio of duodenal to gastric and peptic ulcers was 2.9. Whereas in civilian life it may be possible for patients with duodenal ulcers to carry on with the aid of treatment from their family doctors, while those with stomach ulcers would more often have to go to hospital, it seems probable that most Service men with duodenal ulcers would be sent to hospital, owing to the difficulties of treatment and diet. It may well be, therefore, that the E.M.S. figures give a truer picture of the relative incidence of duodenal and gastric ulcers than other sources. Table III shows the age distribution and the ratio of duodenal to other ulcers of the stomach among male Service patients admitted to E.M.S. hospitals.

The ratio of duodenal to gastric ulcers for all ages rose from 2.9 in 1940 to 4.7 in 1942 and then declined to 4.1 in 1946-7. This may reflect not so much a change in relative incidence as the fact that in the later war years, when owing to the increase in battle casualties there was more demand for hospital beds, it was no longer policy to send so many cases of duodenal ulcer to hospital. For the whole period 1940-7 there were 4.3 times as many men admitted with duodenal as with gastric ulcers in the age group 15-34 and three times as many at ages 35-44. The proportion of duodenal to gastric ulcers was generally greater in the age groups under 34. Although the ratio in these age groups declined in 1943 and 1944, it was rising again by 1947.

TABLE III.—*E.M.S. Hospitals. Men admitted for Gastric, Duodenal, and Peptic Ulcers, 1940-7. (One-fifth sample)*

Year	Diagnosis	Ages					
		15-24	25-34	35-44	45-54	45 and Over	All ages
1940	Gastric ulcer	40	75	88	203	20	223
	Duodenal ulcer	116	279	197	592	47	639
	Ratio D.U./G.U.	2.9	3.7	2.2	2.9	2.4	2.9
	Peptic ulcer	8	44	37	89	17	106
	Ratio D.U./G.U. and P.U.	2.4	2.3	1.6	2.0	1.3	1.9
1941	Gastric ulcer	40	114	80	234	18	252
	Duodenal ulcer	157	469	197	823	35	858
	Ratio D.U./G.U.	3.9	4.1	2.5	3.5	1.9	3.4
	Peptic ulcer	15	31	20	66	5	71
	Ratio D.U./G.U. and P.U.	2.8	3.2	2.0	2.0	1.5	2.7
1942	Gastric ulcer	28	86	73	187	8	195
	Duodenal ulcer	174	438	260	872	36	908
	Ratio D.U./G.U.	6.2	5.1	3.6	4.7	4.5	4.7
	Peptic ulcer	3	27	21	51	1	52
	Ratio D.U./G.U. and P.U.	5.6	3.9	2.8	3.7	4.0	3.7
1943	Gastric ulcer	28	71	66	165	11	176
	Duodenal ulcer	111	308	234	653	23	676
	Ratio D.U./G.U.	4.0	4.3	3.5	4.0	2.1	3.8
	Peptic ulcer	5	5	6	16	3	19
	Ratio D.U./G.U. and P.U.	3.4	4.1	3.3	3.6	1.6	3.5
1944	Gastric ulcer	35	86	81	202	14	216
	Duodenal ulcer	126	392	281	799	36	835
	Ratio D.U./G.U.	3.6	4.6	3.5	4.0	2.6	3.9
	Peptic ulcer	8	20	27	55	3	58
	Ratio D.U./G.U. and P.U.	2.9	3.7	2.6	3.1	2.1	3.0
1945	Gastric ulcer	30	115	98	243	16	259
	Duodenal ulcer	158	495	302	955	24	979
	Ratio D.U./G.U.	5.3	4.3	3.1	3.9	1.5	3.8
	Peptic ulcer	10	29	16	55	3	58
	Ratio D.U./G.U. and P.U.	4.0	3.4	2.6	3.2	1.3	3.1
1946 and 1947	Gastric ulcer	19	32	23	74	—	74
	Duodenal ulcer	98	147	53	298	6	304
	Ratio D.U./G.U.	5.2	4.6	2.3	4.0	—	4.1
	Peptic ulcer	5	8	6	19	4	23
	Ratio D.U./G.U. and P.U.	4.1	3.7	1.8	3.2	1.5	3.1
Total 1940-7	Gastric ulcer	220	579	509	1,308	87	1,395
	Duodenal ulcer	940	2,528	1,524	4,992	207	5,199
	Ratio D.U./G.U.	4.3	4.4	3.0	3.8	2.4	3.7
	Peptic ulcer	54	164	133	351	36	387
	Ratio D.U./G.U. and P.U.	3.4	3.4	2.4	3.0	1.7	2.9

Comparison of the E.M.S. admissions may be made with those for the New York Hospitals, 1933, and Cardiff Royal Infirmary, 1946, which are shown in Table IV.

TABLE IV

	E.M.S. Hospitals (Males), 1940-7	New York Hospitals, 1933	Cardiff Royal Infirmary, 1946
Ulcer of stomach	1,782	1,783	67
Duodenal ulcer	5,199	2,248	58
Total	6,981	4,031	125
U. of S. as percentage of total	25.53	44.23	53.60

The differences between the percentages of stomach ulcers and those of all ulcers in these three groups are:

E.M.S. and New York	..	Difference, 18.70	..	Standard error, 1.88
E.M.S. and Cardiff	..	" 28.07	..	" 8.98
New York and Cardiff	..	" 9.37	..	" 4.52

The differences between the E.M.S. figures and those for Cardiff and New York are therefore highly significant; that between New York and Cardiff is barely so. It seems reasonable to infer from this, either that E.M.S. patients were drawn from a population more subject to duodenal ulcers than the general one, or else that, while they showed the same proportion of duodenal to gastric ulcers as the general population, more cases of duodenal ulcer came into hospital.

TABLE V.—*Social Survey, 1947. Total Illnesses—New, Recurrent, and Continuous*

Diagnosis	Males				Females			
	16-44	45-64	65 Up	All	16-44	45-64	65 Up	All
Gastric ulcer	77	81	23	181	18	39	21	78
Duodenal ulcer	128	126	19	273	27	28	6	61
Peptic ulcer	21	12	4	37	—	6	4	10
D.U./G.U.	1.7	1.6	0.8	1.5	1.5	0.7	0.3	0.8
D.U./G.U. and P.U.	1.3	1.4	0.7	1.5	1.5	0.6	0.2	0.7

Table V shows the number of people recorded by the Survey of Sickness as reporting ulcers during 1947. The figures given are for all illnesses reported, whether new, recurrent, or continuing from a month prior to that of interview. Those who were in hospital at the time were not included in the inquiry. For men of working age these figures again show a preponderance of duodenal over gastric ulcers. The same is roughly true of women, since relatively few are in gainful occupations after they reach the age of 45. The proportion of duodenal to all ulcers differs significantly between the sexes (difference, 11.20; S.E., 4.59), but not between men aged 16-44 and 45-64 (difference, 0.29; S.E., 4.69).

Statistics of cause of death do not distinguish cases of haemorrhage and perforation. The relative proportions in the E.M.S. sample and the Cardiff Royal Infirmary discharges are shown in Table VI.

TABLE VI

	E.M.S. Hospitals, Males, 1940-7		Cardiff Royal Infirmary, 1946	
	Proportion %	Case Fatality Rate (%)	Proportion (%)	Case Fatality Rate (%)
Gastric ulcer:				
Perforation	24.9	6.1	40.4	26.1
Haemorrhage	4.6	3.1	17.5	10.0
Unqualified	70.5	0.2	42.1	4.2
Duodenal ulcer:				
Perforation	10.6	4.7	13.8	12.5
Haemorrhage	2.2	3.5	12.1	28.6
Unqualified	87.2	0.2	74.1	4.7

Tidy (1944) has stated that the case fatality rate taken over a long period at St. Thomas's was 12.5% for gastric and 10% for duodenal ulcers. This may be compared with 13% for gastric and 7.6% for duodenal ulcers in the New York Hospitals in 1933, and with 11.9% for gastric and 8.6% for duodenal ulcers at Cardiff Royal Infirmary in 1946. The experience in the New York Hospitals in 1933 showed 2,248 duodenal ulcers with 172 deaths and 1,783 gastric ulcers with 225 deaths. On this basis the expected deaths from 1,782 cases of gastric ulcer in the E.M.S. sample would be 225, compared with 21 actual deaths, while from 5,199 cases of duodenal ulcer 398 deaths would be expected, compared with 37 actual. This strengthens the impression that cases were admitted to E.M.S. hospitals which would not normally be treated in hospital. It may be hoped that when statistics become available from the Ministry of National Insurance and from the Registrar-General's National Morbidity Inquiry, fresh light will be shed on the relative incidence of duodenal and gastric ulcer.

REFERENCES

- Cardiff Royal Infirmary Clinical Record, 1946.
Hospital Discharge Study. An analysis of 576,623 patients discharged from hospitals in New York City in 1933. Welfare Council of New York City.
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The Ministry of Health has issued a third list of amendments to the National Health Service Hospitals Directory.