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Long-term survival expectations of cancer patients in Europe in 2000–2002

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ABSTRACT

Period analysis has been shown to provide more up-to-date estimates of long-term cancer survival rates than traditional cohort-based analysis. Here, we provide detailed period estimates of 5- and 10-year relative survival by cancer site, country, sex and age for calendar years 2000–2002. In addition, pan-European estimates of 1-, 5- and 10-year relative survival are provided. Overall, survival estimates were mostly higher than previously available cohort estimates. For most cancer sites, survival in countries from Northern Europe, Central Europe and Southern Europe was substantially higher than in the United Kingdom and Ireland and in countries from Eastern Europe. Furthermore, relative survival was also better in female than in male patients and decreased with age for most cancer sites.

1. Introduction

The EUROCARE project has set the stage for monitoring and comparing cancer survival across European countries, and its findings have been very influential in development and promotion of national cancer plans.[1,2] A major limitation has been, however, that survival figures pertained to patients who were diagnosed and treated many years ago, and thus did not reflect more recent developments, especially possible developments resulting from the latest therapeutic innovations, economic developments or enhanced cancer plans. For example, the EUROCARE-3 results, published in 2003, pertained to patients diagnosed and treated up to 1994 only.[3] The EUROCARE-4 study implemented, for the first time, additional survival analyses by the so-called period method for a subset of cancer registries, which extends estimates of survival for cancer patients in 2000–2002. Period analysis, which was first proposed in 1996,[5] provides more up-to-date long-term survival estimates by exclusively considering survival experience of cancer patients in a recent calendar period.[6–9] Key findings obtained with the 2000–2002 period analysis have recently been reported in a first summary article.[10] Here, we provide

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results of more detailed period analyses by age, sex and European country for selected cancer sites, and we also provide most up-to-date age adjusted 1-, 5- and 10-year pan-European period survival estimates for all 45 cancer sites included in the EUROCARE-4 study.

2. Methods

2.1. Database and data quality

This analysis was restricted to adulthood cancer, i.e. to patients aged 15–99 years at the time of diagnosis, and to the subset of registries included in the EUROCARE-4 period analysis study. The 47 cancer registries included in this substudy, as well as indicators of data quality and completeness of these registries have previously been described in detail.[10] Period estimates of 5-year survival for the 2000–2002 calendar period could be derived from all 47 registries. Derivation of period estimates of 10-year survival requires a longer time series of high quality cancer registry data and was possible for 31 of 47 cancer registries. Table 1 gives an overview on the cancer registries and the numbers of cases included in each period analysis, by registry and four large European regions. Data from national cancer registries were available for the Nordic countries except Denmark, and for Austria, Malta and Slovenia. For the 5-year period analysis, there was also complete population coverage of the United Kingdom and Ireland. Regional coverage was achieved for nine other countries in Central (Belgium, France, Germany, the Netherlands, Switzerland), Eastern (Czech Republic, Poland), and Southern Europe (Italy, Spain). The French cancer registry included in this analysis (Côte d'Or) is restricted to cancers of the digestive tract and to haematologic malignancies only.

2.2. Statistical analysis

All survival estimates refer to the period 2000–2002, and have been obtained by using the period approach.[5–9] In accordance with the standard practice in comparative population-based cancer-survival analyses, relative survival estimates are presented.[11,12] Relative survival was calculated as the ratio of absolute survival of patients with cancer to the expected survival of a group of people of the corresponding sex and age in the general population. Expected survival, based on registry-specific official mortality data, was estimated according to the Hakulinen method.[13] All analyses were carried out by the SEER*Stat software.[14]

Total, sex- and age-specific 5-and 10-year relative survival for the 2000–2002 period were calculated for each European country and each European region, for seven common forms of cancer. In the case of multiple regional registries per country, data were pooled for derivation of country-specific estimates. Total and sex-specific period survival estimates were age adjusted to the standard cancer populations proposed by Corazziari and colleagues.[15] Age-specific analyses were done for age groups 15–59, 60–74 and 75–99. Results for Iceland and Malta, which are based on much smaller numbers of cases than results for other countries, are not included in this part of the analysis, and survival estimates with standard errors larger than 10% units are not presented.

In addition to country- and European region-specific survival estimates, pan-European estimates of age adjusted 1-, 5- and 10-year relative survival are shown for 45 forms of cancer. Age adjustment was done in the same way as in country-specific analyses.[15] In addition, differential regional representation was taken into account by pertinent weighting of European region-specific estimates as described in detail elsewhere.[16]

3. Results

Five-year relative survival of patients with stomach cancer ranged from 33% in Germany to 17% in England and Scotland (Table 2a). Five-year relative survival also exceeded 30% in Austria, Belgium, Italy and Spain, and it was close to or below 20% in the Netherlands, the UK and Ireland and all populations from Eastern Europe included in this analysis. Intermediate levels between 20% and 30% were seen in the North European countries, France, Switzerland and Slovenia. Ten-year relative survival was only slightly lower in most cases, which indicates high tumour-related mortality within 5 years following the diagnosis, but low excess risk thereafter. With few exceptions, survival tended to be higher amongst female than amongst male stomach cancer patients. As even younger patients had relatively low 5-year relative survival, the age gradient in survival was less pronounced for this form of cancer compared to other cancers.

Five-year relative survival of patients with colorectal cancer ranged from 64% in Switzerland to 44% in Poland (Table 2b). It was close to 60% in all countries from Northern Europe, all other countries from Central Europe included in this analysis and in Italy and Spain. It was in the range from 50% to 55% in Slovenia, in all the UK populations and Ireland. Again, 10-year relative survival was only about 5% units lower in most cases, which indicates a very good prognosis for those patients who are still alive after five years in all countries. With the exception of the Eastern countries and Wales, prognosis tended to be better amongst female than amongst male patients. In most countries, there was a moderate age gradient with somewhat lower relative survival amongst older than amongst younger patients. The age gradient was remarkably strong in Switzerland, however, where patients below 60 years of age had by far the highest 5- and 10-year relative survival, whereas survival in the oldest age group was in the medium range when compared to other countries.

With 5-year relative survival up to 16% (Belgium) and 10-year relative survival up to 11% (Sweden), prognosis of patients with cancers of the lung, bronchus and trachea remained very poor even in 2000–2002 (Table 2c). This was true for both sexes, even though prognosis of female patients tended to be slightly better than prognosis of male patients. An age gradient was seen in all countries, but even in the youngest age group (<60 years), 5-year relative survival only ranged from 20.5% (Belgium) to 11% (Czech Republic), and 10-year relative survival only ranged from 14.5% (Sweden) to 8% (Czech Republic).

Overall 5-year relative survival of women with breast cancer exceeded 70% in all countries except the Czech Republic, and it ranged up to 87% in Sweden (Table 2d). Ten-year relative survival was often 10 or more percent units lower, which

Table 1 – Number of adult cancer cases included in each specific period survival analysis 2000–2002 by broad geographical area, country and registry.

Area	Country	Registry	Cases diagnosed in 1996–2002 contributing to 5 years survival	Cases diagnosed in 1991–2002 contributing to 10 years survival
North	Finland	Finland	137,672	224,188
	Iceland	Iceland	6570	10,680
	Norway	Norway	123,130	204,066
	Sweden	Sweden	270,890	447,531
UK_IRE	England	UK_East Anglia	–	130,396
		UK_Northern&Yorkshire	–	257,161
		UK_Oxford	–	119,283
		UK_West Midlands	–	259,857
		UK_England_National	1,285,592	–
	Ireland	Ireland	90,751	–
	Northern Ireland	UK_Northern Ireland	42,933	60,965
	Scotland	UK_Scotland	165,000	279,762
	Wales	UK_Wales	93,436	–
Centre	Austria	Austria	232,555	–
	Belgium	Flemish	139,604	–
	France	Cote d'Or Digestive	3787	6170
		Cote d'Or Haematologique	1602	–
	Germany	Saarland	37,662	–
	The Netherlands	Amsterdam	71,813	120,357
		Eindhoven	21,660	37,333
		North Netherlands	49,477	–
	Switzerland	Basel	10,327	18,371
		Geneva	12,269	19,982
		St. Gallen	13,086	21,627
		Ticino	10,135	–
East	Czech Republic	West Bohemia	26,582	44,082
	Poland	Cracow	18,644	29,493
		Warsaw	38,926	68,614
South	Italy	Alto Adige	14,698	–
		Biella	8261	–
		Ferrara	16,003	26,189
		Firenze	46,763	78,341
		Friuli V.G.	54,082	–
		Genova	29,669	55,634
		Modena	24,703	40,158
		Napoli	7500	–
		Parma	17,464	28,727
		Ragusa	7423	11,623
		Reggio Emilia	17,913	–
		Romagna	41,687	65,290
		Salerno	23,543	–
		Sassari	12,619	18,914
		Torino	29,999	52,740
		Trento	12,129	–
		Umbria	32,712	–
		Veneto	55,500	106,508
	Malta	Malta	8410	11,633
	Slovenia	Slovenia	47,978	78,363
	Spain	Albacete	1698	–
		Castellòn	1287	–
		Girona	16,846	–
Total number of cases			3,432,990	2,934,038
Total number of registries			47	31

reflects the relatively common occurrence of late deaths amongst women with breast cancer. High five-year relative survival rates between 84 and 87% were seen for all Northern countries included in this analysis and for Switzerland. Five-year relative survival rates ranged between 80% and 84% in Austria, the Netherlands, Italy and Spain, were close to 80% in Belgium, Germany, Poland and the populations from the UK and Ireland, and below 70% in the Czech Republic. In most but not all populations, there was a relatively minor gradient in both 5- and 10-year relative survival between age groups 15–59 and 60–74 years, and a more pronounced gradient between age groups 60–74 and 75+ years.

Table 2a – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with stomach cancer.

Country/region	5-year relative survival												10-year relative survival											
	Total*		Men*		Women*		15–59		60–74		75–99		Total*		Men*		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	24.4	0.6	22.5	0.8	26.9	1.0	29.7	1.3	24.8	1.0	18.3	1.0	20.4	0.7	18.6	0.9	22.6	1.1	25.0	1.3	20.7	1.0	15.4	1.3
Finland	26.7	1.1	25.2	1.6	29.4	1.8	32.2	2.2	27.9	1.8	19.8	2.0	22.2	1.3	18.8	1.7	25.6	1.9	26.9	2.2	24.0	1.9	15.5	2.6
Norway	24.7	1.4	22.5	1.7	26.8	2.2	31.0	3.1	24.9	2.0	18.1	1.9	20.0	1.4	18.7	1.9	21.4	2.3	26.4	3.1	19.7	2.0	15.5	2.5
Sweden	21.7	0.9	20.6	1.2	23.2	1.5	26.4	2.0	21.9	1.5	16.4	1.4	18.5	1.0	17.6	1.3	19.2	1.6	22.1	1.9	18.7	1.5	14.3	1.9
Central	28.4	0.6	26.6	0.7	30.8	0.9	33.7	1.2	28.8	0.9	22.5	1.0	18.7	1.2	17.5	1.6	19.7	2.0	23.7	2.3	18.5	1.7	13.6	2.6
Austria	31.1	1.0	30.3	1.3	32.0	1.5	35.3	1.9	32.2	1.5	25.8	1.6												
Belgium	32.7	1.3	28.5	1.6	39.2	2.2	41.0	2.8	33.6	1.9	22.8	1.9												
France	22.9	4.2	22.6	4.8			34.2	8.6	24.2	6.3	11.2	6.6							22.0	9.5	22.6	6.7		
Germany	33.3	2.6	34.9	3.5	31.4	3.8	41.1	5.0	31.2	3.7	29.9	5.0												
The Netherlands	20.1	1.1	19.2	1.3	21.1	1.8	23.1	2.1	20.6	1.6	15.9	1.8	17.9	1.5	16.8	1.9	19.0	2.4	21.5	2.6	17.7	2.1	14.3	3.3
Switzerland	25.6	2.0	24.4	2.5	26.5	3.4	36.5	4.3	22.5	2.8	18.9	3.4	21.1	2.5	20.9	3.4	20.9	4.3	30.9	5.2	20.6	3.7	13.0	4.9
East	17.1	1.3	17.1	1.7	17.4	2.0	23.8	2.5	17.0	1.8	10.4	2.3	14.3	1.5	12.4	1.8	15.5	2.3	18.6	2.4	13.8	1.9	11.2	3.4
Czech Republic	17.8	2.4					36.3	5.6	13.2	3.0	9.0	3.7	16.8	3.2					30.6	5.9	9.8	3.0	17.2	8.1
Poland	17.0	1.5	16.7	1.9	18.2	2.5.	20.3	2.7	18.3	2.2	11.5	2.9	13.6	1.7	11.2	2.1	16.2	2.9	15.4	2.5	15.0	2.4	9.5	3.9
South	31.7	0.5	29.4	0.7	35.4	0.8	38.9	1.1	32.2	0.7	23.4	0.8	28.0	0.7	25.4	0.9	31.6	1.1	34.2	1.4	28.3	1.0	20.9	1.4
Italy	33.0	0.6	30.8	0.7	36.4	0.9	40.6	1.3	33.6	0.8	24.2	0.8	30.1	0.8	27.6	1.0	33.4	1.3	37.3	1.6	30.3	1.1	22.4	1.5
Slovenia	23.2	1.4	21.6	1.9	26.7	2.4	29.2	2.9	24.4	2.0	15.1	2.7	17.9	1.6	14.6	2.0	22.0	2.7	24.7	2.8	20.2	2.3	7.5	3.3
Spain	31.8	3.3	26.4	3.9	42.3	5.8	45.7	7.3	30.0	4.7	20.2	5.4												
UK/Ireland	17.1	0.3	16.2	0.4	19.2	0.5	21.5	0.7	17.9	0.4	10.9	0.4	16.4	0.6	14.7	0.7	19.5	1.0	16.9	1.0	16.6	0.8	15.2	1.3
England	16.9	0.3	15.8	0.4	19.5	0.7	21.3	0.8	17.9	0.5	10.4	0.4	16.5	0.7	14.9	0.8	20.5	1.3	17.5	1.3	17.2	1.0	14.4	1.6
Ireland	18.8	1.3	17.7	1.6	20.3	2.1	27.5	2.9	18.1	1.8	10.7	1.9												
Northern Ireland	18.9	1.8	19.1	2.3	18.0	2.9	16.4	3.4	19.7	2.7	19.4	3.3	19.9	2.6	17.2	3.2	22.2	3.8	15.4	3.4	18.1	3.1	28.6	6.7
Scotland	16.6	0.9	15.6	1.2	18.5	1.7	19.6	2.1	17.9	1.3	11.4	1.3	15.2	1.1	13.3	1.5	17.6	1.8	15.5	2.0	15.3	1.4	14.8	2.4
Wales	18.3	1.3	19.7	1.7	17.0	2.1	22.6	3.1	17.0	1.6	13.9	1.9												

* Age adjusted.

Table 2b – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with colorectal cancer.

Country/region	5-year relative survival												10-year relative survival											
	Total*		Men*		Women*		15–59		60–74		75–99		Total*		Men*		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	59.9	0.4	58.5	0.5	61.4	0.5	63.1	0.7	60.4	0.6	55.2	0.7	54.7	0.5	53.3	0.8	56.4	0.7	57.3	0.8	54.3	0.7	52.2	1.2
Finland	59.1	0.8	57.1	1.3	61.4	1.1	62.8	1.4	59.6	1.2	53.7	1.8	54.3	1.2	50.2	1.8	57.9	1.5	58.5	1.5	54.7	1.5	49.2	3.0
Norway	59.5	0.7	57.5	1.0	61.7	0.9	62.9	1.3	61.2	1.0	53.5	1.3	55.1	0.9	54.3	1.4	56.4	1.2	56.6	1.4	56.2	1.2	51.3	2.2
Sweden	60.3	0.5	59.6	0.8	61.1	0.8	63.2	1.1	60.3	0.8	57.1	1.0	54.5	0.7	53.6	1.1	55.6	0.9	56.9	1.2	53.0	1.0	53.9	1.7
Central	60.2	0.3	59.1	0.5	61.8	0.5	64.9	0.6	60.2	0.5	55.1	0.7	55.3	1.0	53.1	1.5	57.5	1.3	58.2	1.3	55.3	1.2		
Austria	60.6	0.6	60.1	0.9	61.8	0.8	63.9	1.1	60.8	0.8	56.6	1.3												
Belgium	60.7	0.6	59.2	0.9	62.4	0.9	67.3	1.2	60.7	0.9	53.0	1.3												
France	60.3	2.3	58.2	3.0	64.2	3.5	67.0	4.4	54.9	3.2	62.8	4.5	53.8	3.9	48.9	5.5	59.2	5.6	52.8	5.1	45.4	3.8		
Germany	61.4	1.4	59.6	2.1	64.1	1.9	66.0	2.6	62.9	1.8	54.0	2.9												
The Netherlands	58.7	0.7	57.9	1.0	59.8	0.9	61.3	1.2	58.3	1.0	56.4	1.5	55.5	1.2	54.2	2.0	57.0	1.6	56.1	1.6	56.2	1.5	53.6	3.2
Switzerland	63.8	1.2	62.6	1.8	64.7	1.7	74.2	2.1	62.4	1.8	54.4	2.5	57.0	1.8	53.6	2.8	59.3	2.4	67.5	2.7	57.5	2.5	44.6	4.4
East	44.7	1.0	46.4	1.4	43.3	1.3	51.8	1.7	46.0	1.3	35.9	2.2	41.7	1.6	45.1	2.7	39.4	1.9	44.4	1.9	43.3	1.6	37.2	4.5
Czech Republic	46.3	1.7	47.5	2.4	45.3	2.4	56.4	2.7	46.4	2.2	36.4	3.8	44.0	2.9	49.7	4.9	39.5	3.5	49.2	3.1	44.9	2.8	39.0	8.5
Poland	43.8	1.2	45.7	1.8	42.4	1.6	48.9	2.2	45.7	1.5	35.8	2.7	40.4	1.9	42.6	3.2	39.1	2.3	41.2	2.4	42.4	1.9	36.3	5.3
South	58.6	0.3	58.2	0.5	59.3	0.5	63.7	0.7	60.7	0.5	50.1	0.7	54.0	0.6	54.0	0.9	54.8	0.8	58.2	0.9	55.1	0.7	47.7	1.4
Italy	59.5	0.4	59.2	0.5	60.1	0.5	64.8	0.7	61.7	0.5	50.7	0.7	55.2	0.6	55.1	1.0	56.0	0.8	59.7	1.0	56.3	0.8	48.7	1.5
Slovenia	50.5	1.2	49.1	1.7	52.1	1.7	58.6	2.0	52.4	1.6	39.4	2.8	47.4	1.9	47.3	3.1	48.1	2.5	51.4	2.3	50.1	2.1	39.0	5.3
Spain	61.5	2.0	59.9	2.7	64.1	2.8	60.1	3.6	65.1	2.7	57.2	4.2												
UK/Ireland	52.3	0.2	51.3	0.3	53.7	0.3	56.9	0.4	53.9	0.3	44.9	0.4	50.1	0.5	48.2	0.7	52.4	0.7	49.6	0.7	49.4	0.6	51.0	1.3
England	51.8	0.2	50.7	0.3	53.3	0.3	56.6	0.4	53.3	0.3	44.3	0.4	50.8	0.6	48.4	0.9	53.5	0.9	48.7	0.9	49.1	0.7	54.6	1.6
Ireland	54.3	0.9	53.0	1.2	56.1	1.3	58.1	1.5	55.8	1.2	48.0	1.8												
Northern Ireland	54.5	1.2	53.4	1.7	55.5	1.7	58.6	2.3	55.4	1.7	48.4	2.5	53.0	1.8	52.1	2.6	54.2	2.4	53.4	2.5	51.6	2.2	54.5	4.5
Scotland	54.1	0.7	53.8	0.9	54.7	0.9	57.6	1.3	56.2	0.9	47.1	1.3	48.6	0.9	47.6	1.4	50.0	1.2	50.9	1.4	50.3	1.2	43.2	2.1
Wales	53.3	0.9	53.5	1.2	53.5	1.3	57.4	1.7	54.2	1.3	47.7	1.7												

* Age adjusted.

Table 2c – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with cancer of the lung, bronchus and trachea.

Country/region	5-year relative survival												10-year relative survival											
	Total*		Men*		Women*		15–59		60–74		75–99		Total*		Men*		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	11.9	0.3	10.1	0.4	14.8	0.5	17.1	0.6	11.5	0.4	6.6	0.4	8.9	0.3	7.4	0.4	11.1	0.5	13.5	0.6	7.5	0.4	5.7	0.7
Finland	9.3	0.5	8.4	0.6	11.8	1.0	14.1	1.1	8.4	0.6	5.8	0.8	6.0	0.5	5.6	0.6	6.2	0.9	10.1	1.0	4.9	0.5	3.6	1.1
Norway	11.2	0.5	9.7	0.6	13.6	0.9	17.7	1.1	11.1	0.7	4.5	0.7	8.3	0.5	6.8	0.6	10.5	0.9	14.2	1.1	7.2	0.7	3.8	0.9
Sweden	14.0	0.5	12.0	0.6	16.3	0.8	18.0	1.0	14.0	0.6	8.8	0.8	11.1	0.6	9.3	0.8	12.8	0.8	14.5	0.9	9.5	0.6	8.7	1.3
Central	14.5	0.2	13.9	0.3	15.9	0.5	18.4	0.5	14.8	0.3	9.5	0.5	9.6	0.5	10.3	0.7	8.7	0.8	12.3	0.8	9.3	0.6	7.0	1.3
Austria	14.7	0.5	13.5	0.6	17.8	0.9	19.8	0.8	14.5	0.7	9.6	1.0												
Belgium	16.3	0.5	15.0	0.5	19.9	1.1	20.5	0.9	16.0	0.6	10.8	0.8												
Germany	14.1	1.1	14.3	1.3	14.3	2.1	18.4	2.0	13.1	1.3	10.3	2.4												
The Netherlands	12.6	0.4	13.0	0.5	11.9	0.7	15.3	0.8	14.1	0.6	7.7	0.8	9.8	0.6	10.7	0.8	8.1	0.8	12.3	0.9	9.5	0.7	7.2	1.4
Switzerland	15.3	0.9	14.9	1.1	15.3	1.7	18.7	1.7	15.8	1.2	11.1	1.8	8.8	1.1			9.9	1.6	11.7	1.7	8.1	1.3	6.1	2.8
East	9.1	0.5	8.2	0.6	10.9	0.9	13.4	1.0	8.5	0.6	5.6	1.1	6.2	0.6	5.6	0.8	6.6	1.2	8.7	0.9	5.4	0.6	4.7	1.7
Czech Republic	6.5	0.7					11.3	1.7	7.3	1.1	2.2	1.1							8.4	1.5	5.2	1.2		
Poland	10.1	0.6	9.5	0.8	11.0	1.1	14.2	1.2	8.8	0.7	7.4	1.5	6.3	0.8	6.1	1.1			8.6	1.0	5.5	0.7	5.4	2.3
South	12.7	0.2	11.8	0.3	15.8	0.6	16.9	0.5	13.2	0.3	6.7	0.4	9.1	0.3	8.3	0.3	11.7	0.7	12.9	0.6	9.2	0.4	4.2	0.6
Italy	13.3	0.3	12.3	0.3	16.6	0.6	17.5	0.6	13.8	0.4	6.9	0.4	9.6	0.4	8.5	0.4	12.5	0.8	13.1	0.7	9.9	0.4	4.3	0.6
Slovenia	9.9	0.7	9.3	0.8	12.0	1.5	15.7	1.3	10.2	0.9	3.3	1.3	7.1	0.6			9.4	1.3	14.4	1.4	7.2	0.9		
Spain	12.2	1.2	12.5	1.2			15.4	2.6	12.4	1.6	8.4	2.1												
UK/Ireland	8.6	0.1	7.9	0.2	9.6	0.2	12.0	0.3	8.2	0.1	4.1	0.1	6.8	0.2	6.5	0.3	7.1	0.3	9.0	0.4	5.8	0.2	4.6	0.4
England	8.4	0.1	7.7	0.2	9.3	0.2	11.5	0.3	8.1	0.2	3.8	0.2	7.0	0.3	6.6	0.3	7.3	0.4	8.8	0.5	6.1	0.3	5.0	0.5
Ireland	10.9	0.6	10.0	0.7	12.3	1.0	15.4	1.3	9.4	0.7	6.4	0.9												
Northern Ireland	10.7	0.9	9.6	1.1	12.0	1.3	13.5	1.7	8.7	0.8	7.5	1.2							10.8	1.6	7.3	0.9	7.6	2.3
Scotland	8.2	0.3	7.8	0.5	8.9	0.5	12.1	0.8	7.6	0.4	4.1	0.4	6.1	0.4	6.1	0.5	6.4	0.5	9.2	0.7	5.1	0.3	3.6	0.6
Wales	10.4	0.7	9.6	0.9	11.3	1.1	15.6	1.4	8.7	0.7	5.2	0.8												

* Age adjusted.

Table 2d – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with breast cancer.

Country/region	5-year relative survival								10-year relative survival							
	Women*		15–59		60–74		75–99		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	85.9	0.3	89.2	0.3	89.0	0.4	78.8	1.0	76.0	0.5	80.7	0.4	80.0	0.6	65.8	1.6
Finland	85.2	0.7	90.5	0.5	87.1	0.8	77.7	2.0	73.5	1.1	81.4	0.7	76.3	1.2	61.6	3.4
Norway	84.1	0.7	86.8	0.6	87.2	0.9	77.8	2.0	73.1	1.1	77.5	0.9	77.3	1.4	63.2	3.2
Sweden	86.8	0.5	89.2	0.4	90.6	0.5	79.4	1.3	78.1	0.7	81.5	0.5	82.6	0.8	68.5	2.2
Central	81.7	0.3	86.2	0.3	83.9	0.4	74.4	0.9	73.3	1.0	76.2	0.7	77.3	1.2	65.4	3.0
Austria	82.3	0.6	85.4	0.6	83.8	0.8	77.2	1.5								
Belgium	79.7	0.6	86.7	0.5	81.8	0.7	70.3	1.7								
Germany	78.7	1.5	86.0	1.4	78.3	1.9	71.7	4.0								
The Netherlands	83.3	0.6	86.0	0.5	86.5	0.8	75.9	1.7	73.5	1.2	75.7	0.8	77.7	1.4	65.5	3.6
Switzerland	84.5	1.0	87.7	0.9	88.7	1.2	75.8	2.8	73.5	1.9	77.7	1.5	76.0	2.2	66.9	5.5
East	73.9	1.1	81.4	0.9	74.9	1.3	65.4	3.2	60.3	1.8	69.5	1.2	62.2	1.9	49.5	5.5
Czech Republic	67.4	2.3	77.9	2.2	70.5	3.1	52.4	6.0	56.4	3.9	65.9	2.6	60.5	4.0		
Poland	76.0	1.3	82.3	1.0	76.1	1.5	69.8	3.6	61.1	2.1	70.5	1.4	62.2	2.1	51.6	6.2
South	82.9	0.3	88.3	0.3	85.0	0.4	74.8	0.9	73.4	0.6	78.6	0.5	76.5	0.7	63.6	1.9
Italy	83.7	0.3	89.1	0.3	86.3	0.4	75.0	0.9	74.7	0.7	80.5	0.5	78.4	0.7	63.5	1.9
Slovenia	75.3	1.4	82.4	1.2	75.6	1.6	68.3	3.9	63.5	3.4	65.8	1.9	63.9	2.7	62.2	11.0
Spain	82.8	1.5	87.0	1.2	82.4	1.9	79.5	4.2								
UK/Ireland	77.7	0.2	84.4	0.2	81.2	0.3	67.0	0.5	74.8	0.4	72.6	0.6	72.6	0.6	67.1	1.8
England	77.8	0.2	84.6	0.2	81.5	0.3	66.6	0.5	72.9	0.8	74.7	0.5	73.2	0.8	72.3	2.3
Ireland	76.2	1.0	81.6	0.8	77.5	1.3	70.8	2.6								
Northern Ireland	79.5	1.3	84.7	1.1	83.2	1.7	70.4	3.4	70.1	2.6	73.9	1.6	72.1	2.8	68.4	7.7
Scotland	77.3	0.7	84.9	0.6	80.3	0.9	66.0	1.8	66.7	1.0	75.2	0.7	71.1	1.2	53.4	2.8
Wales	78.4	0.8	83.5	0.8	80.7	1.2	70.9	2.2								

* Age adjusted.

Table 2e – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with prostate cancer.

Country/region	5-year relative survival								10-year relative survival							
	Men*		15–59		60–74		75–99		Men*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	82.1	0.4	86.1	0.7	85.5	0.4	75.3	0.7	62.0	0.7	67.3	1.5	67.1	0.7	52.1	1.3
Finland	84.4	0.8	86.7	1.4	86.7	0.8	82.5	1.7	66.1	1.6	69.3	3.4	68.9	1.6	57.6	3.4
Norway	79.0	0.8	86.6	1.4	84.3	0.9	68.1	1.5	59.0	1.4	64.9	3.4	67.8	1.5	41.9	2.3
Sweden	82.6	0.5	85.2	1.1	85.4	0.5	75.8	0.9	61.4	1.0	66.6	2.0	66.0	0.9	54.3	1.6
Central	85.7	0.4	91.6	0.6	90.4	0.4	75.7	0.9	71.7	1.7	76.0	2.8	74.6	1.6	64.7	3.4
Austria	88.7	0.6	95.1	0.8	92.9	0.6	79.2	1.7								
Belgium	85.6	0.6	91.9	1.0	91.5	0.6	73.2	1.6								
Germany	84.9	2.2	91.7	3.1	90.9	1.8	76.2	4.5								
The Netherlands	80.5	1.0	81.4	1.8	83.5	0.9	76.4	1.8	70.6	2.4	71.8	3.4	71.7	2.0	66.3	4.4
Switzerland	86.9	1.2	93.2	2.1	92.4	1.2	74.4	2.6	74.5	2.8	82.2	5.1	80.2	2.7	63.2	5.4
East	68.0	2.0	64.1	4.7	78.6	1.9	60.8	3.8			47.0	6.5	62.2	3.4	44.1	7.8
Czech Republic	58.6	3.9	45.0	10.1	71.3	4.0	65.3	7.5	39.8	4.7	28.3	8.9	53.2	6.3		
Poland	70.7	2.2	70.6	5.2	81.0	2.1	58.4	4.4			52.3	9.4	64.7	4.0	41.9	9.3
South	82.8	0.5	86.1	1.1	87.6	0.5	74.5	1.0	67.7	1.3	71.9	2.5	76.0	1.2	55.0	2.3
Italy	84.1	0.5	87.2	1.1	88.9	0.5	75.7	1.0	69.4	1.3	74.0	2.6	78.1	1.2	57.3	2.4
Slovenia	63.3	2.1	71.7	4.5	70.1	2.3	46.4	4.4	40.4	5.8			46.9	7.6	17.7	6.1
Spain	89.3	2.8	94.2	5.1	87.7	2.5	82.1	4.8								
UK/Ireland	73.7	0.3	78.5	0.6	79.5	0.3	63.5	0.5	57.8	0.9	59.6	1.8	62.0	1.0	53.0	1.7
England	74.0	0.3	79.2	0.7	79.5	0.3	63.6	0.5	58.8	1.2	60.7	2.4	62.5	1.2	54.5	2.1
Ireland	77.6	1.3	84.1	2.3	83.9	1.3	67.1	2.3								
Northern Ireland	69.6	2.4	65.6	5.6	79.3	2.3	59.8	3.4	54.4	4.0	43.0	8.6	55.7	4.7	64.1	7.0
Scotland	71.0	1.1	70.1	2.5	77.8	1.1	63.6	1.8	55.3	1.7	57.3	3.3	61.0	1.8	46.3	3.1
Wales	71.8	1.4	76.2	3.1	76.4	1.4	60.9	2.1								

* Age adjusted.

Table 2f – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with kidney cancer.

Country/region	5-year relative survival												10-year relative survival											
	Total*		Men*		Women*		15–59		60–74		75–99		Total*		Men*		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	55.9	0.8	55.0	1.1	57.5	1.1	62.2	1.3	56.9	1.2	47.2	1.8	46.9	1.0	46.3	1.5	48.0	1.4	55.2	1.4	47.4	1.3	37.1	2.5
Finland	58.6	1.5	55.5	2.1	62.8	2.0	62.3	2.2	61.9	2.0	49.5	3.5	49.6	2.1	47.9	2.9	52.7	2.9	55.7	2.3	52.0	2.4	39.6	5.8
Norway	51.6	1.6	52.9	2.2	49.5	2.5	61.7	2.6	52.0	2.6	39.3	3.3	42.9	1.9	44.9	3.1	40.1	2.7	55.4	2.9	44.6	2.9	26.8	4.3
Sweden	56.8	1.2	56.7	1.6	57.5	1.7	63.2	2.0	55.5	1.7	50.4	2.6	48.0	1.5	47.5	2.2	48.7	2.0	55.8	2.1	45.3	1.9	42.2	3.8
Central	63.8	0.7	63.3	1.0	64.8	1.0	73.9	1.0	64.4	1.0	52.2	1.7	45.4	2.3	42.7	3.2	50.1	3.4	55.3	2.7	38.7	2.6	43.9	6.4
Austria	71.2	1.1	71.6	1.7	71.5	1.5	81.9	1.4	72.3	1.5	58.8	2.8												
Belgium	60.4	1.4	61.5	1.9	60.0	2.0	73.1	2.1	60.2	1.9	47.7	3.2												
Germany	66.2	3.0	66.9	4.5	66.0	4.3	79.2	4.0	66.2	3.9	55.6	7.9												
The Netherlands	54.0	1.6	51.7	2.2	57.1	2.5	59.1	2.4	53.7	2.2	47.9	3.9	43.0	2.8	40.1	4.0	48.0	4.2	49.3	3.1	35.6	2.9	46.0	8.3
Switzerland	62.4	2.7	61.0	3.5	66.5	4.2	73.7	4.0	64.7	4.0	46.8	6.2	53.5	3.9	51.7	5.5	58.5	5.8	75.4	4.9	49.4	5.4	37.0	9.9
East	51.5	1.8	53.2	2.6	50.4	2.6	67.7	2.5	49.6	2.3	38.6	4.7	47.5	3.0	48.8	5.7	45.7	3.5	58.3	2.9	42.9	2.6	43.1	9.1
Czech Republic	53.0	2.9	56.6	4.7	49.3	4.0	66.9	3.8	55.0	3.9	35.7	7.5	50.8	5.6			41.6	4.9	58.9	4.7	50.5	5.0		
Poland	50.5	2.3	49.9	3.2	50.9	3.5	68.1	3.3	46.4	2.8	39.5	6.1	44.9	3.5	39.7	5.2	47.5	4.9	57.7	3.8	38.9	3.0		
South	64.7	0.7	63.5	0.9	67.1	1.1	75.9	1.1	67.0	1.0	49.7	1.7	59.3	1.2	56.9	1.7	63.5	1.9	70.3	1.5	60.6	1.5	46.0	3.4
Italy	66.0	0.8	65.0	1.0	68.0	1.2	77.5	1.1	68.8	1.1	50.0	1.8	61.4	1.3	59.0	1.7	65.5	2.0	72.9	1.6	62.9	1.6	47.6	3.5
Slovenia	51.6	2.8	45.1	3.3	59.2	4.4	65.5	3.6	51.6	3.6	36.8	7.3	46.9	4.9			48.8	5.9	60.5	4.6	47.4	5.2		
Spain	73.7	5.2	77.3	6.8	73.2	8.2	82.3	6.2	64.3	6.7														
UK/Ireland	47.2	0.5	47.1	0.6	47.6	0.7	59.7	0.8	47.7	0.7	33.3	1.0	40.6	1.1	40.0	1.5	42.0	1.6	50.3	1.4	38.7	1.4	33.5	2.9
England	46.8	0.5	47.0	0.7	46.7	0.8	59.0	0.9	47.3	0.8	33.3	1.1	40.3	1.4	38.8	1.8	43.0	2.2	50.4	1.7	38.3	1.7	33.1	3.7
Ireland	49.6	2.2	47.6	2.8	54.1	3.3	61.6	3.0	50.9	3.1	36.2	5.1												
Northern Ireland	50.7	2.8	48.9	3.7	54.1	4.3	62.7	4.5	51.4	4.1	36.4	6.1	47.7	4.3	52.7	6.1	44.0	5.9	55.3	5.5	44.2	5.8		
Scotland	45.2	1.5	44.9	2.0	45.9	2.2	58.2	2.5	45.2	2.1	32.1	3.1	38.8	2.0	39.4	3.0	39.3	2.9	48.2	2.8	37.7	2.6	30.8	5.2
Wales	51.7	2.0	49.9	2.6	53.8	3.1	67.7	3.3	53.7	3.0	31.6	4.5												

* Age adjusted.

Table 2g – Period estimates (PEs) for 2000–2002 of 5-year (47 registries) and 10-year (31 registries) relative survival, and corresponding standard errors (SEs) of patients with non-Hodgkin lymphoma.

Country/region	5-year relative survival												10-year relative survival											
	Total*		Men*		Women*		15–59		60–74		75–99		Total*		Men*		Women*		15–59		60–74		75–99	
	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE	PE	SE
North	55.3	0.7	52.6	1.0	58.4	0.9	73.4	0.9	54.5	1.1	38.5	1.5	43.1	0.9	39.3	1.3	47.1	1.2	63.8	1.1	40.9	1.3	27.4	2.1
Finland	53.4	1.3	51.2	2.1	56.4	1.7	73.7	1.6	55.2	2.0	31.1	2.8	44.1	1.7	39.4	2.8	48.3	2.2	66.3	1.9	43.4	2.5	25.2	4.1
Norway	54.0	1.4	50.9	2.0	57.0	2.0	70.0	1.9	53.9	2.3	38.9	3.0	41.7	1.8	38.3	2.4	44.6	2.5	61.4	2.1	42.1	2.7	23.6	4.1
Sweden	57.0	1.0	54.3	1.4	60.5	1.4	75.3	1.4	54.6	1.6	42.1	2.2	43.0	1.2	39.6	1.8	47.2	1.7	62.8	1.7	39.1	1.7	29.5	3.0
Central	53.9	0.7	51.6	1.0	56.4	0.9	71.5	0.9	54.3	1.1	36.5	1.4	41.8	1.8	39.1	3.2	44.9	2.4	59.9	2.0	38.0	2.5	30.1	4.7
Austria	51.9	1.3	50.5	2.0	53.1	1.7	68.3	1.8	50.0	2.1	38.0	2.8												
Belgium	56.9	1.3	55.2	1.8	58.4	1.7	75.6	1.7	58.8	1.9	37.1	2.8												
France	57.4	4.3	57.4	6.6	58.6	5.8	76.3	5.7	60.6	7.2	33.0	9.3												
Germany	61.9	3.2	60.4	5.0	65.9	4.1	79.0	3.9	54.2	4.8	55.9	8.0												
The Netherlands	48.6	1.3	44.7	1.7	52.5	1.9	67.6	1.8	49.2	2.1	30.2	2.6	38.8	2.0	33.8	2.9	43.6	2.9	58.3	2.4	35.9	2.9	24.2	4.8
Switzerland	61.4	2.2	59.4	3.4	64.0	2.8	76.1	2.9	63.8	3.5	40.9	4.7	48.3	4.1	60.8	7.5	44.2	4.8	63.4	4.1	41.7	5.1		
East	45.1	2.4	42.5	3.3	47.8	3.5	64.8	3.1	40.3	3.1	32.2	6.0	33.1	2.6	26.0	2.8	35.8	3.4	58.8	3.7	28.7	3.6	15.5	6.1
Czech Republic	56.1	5.0	52.9	6.5	63.4	7.4	74.4	4.9	47.2	6.6			35.5	6.0			39.8	8.2	65.1	6.3	29.4	7.2		
Poland	40.6	2.6	39.2	3.7	40.9	3.8	60.0	3.9	38.2	3.5	24.3	6.1	30.8	2.8	26.3	3.3	32.5	3.6	55.6	4.5	28.2	4.3	10.5	5.9
South	57.4	0.7	55.7	1.0	59.3	0.9	74.0	0.9	59.1	1.0	38.7	1.4	46.8	1.0	46.4	1.7	47.9	1.3	65.4	1.3	47.8	1.5	28.1	2.4
Italy	57.9	0.7	56.3	1.0	59.7	0.9	74.2	1.0	59.9	1.1	38.6	1.5	47.1	1.1	46.3	1.7	48.6	1.4	65.8	1.4	48.6	1.6	27.3	2.4
Slovenia	55.3	2.7	53.1	4.7	55.5	3.5	71.3	3.4	55.0	3.9	40.5	6.7	44.4	4.8			44.0	5.0	60.6	4.4	42.9	5.6		
Spain	51.9	3.8	40.9	4.9	63.2	5.4	77.2	4.6	49.9	5.3	32.9	8.6												
UK/Ireland	51.2	0.4	49.6	0.5	53.3	0.5	68.6	0.5	50.8	0.6	35.1	0.8	41.3	0.9	40.7	1.5	42.4	1.2	58.8	1.0	39.2	1.2	28.6	2.4
England	51.1	0.4	49.2	0.6	53.4	0.6	68.5	0.6	50.8	0.7	34.9	0.9	41.3	1.2	39.1	1.7	43.5	1.6	57.0	1.3	38.5	1.5	31.1	3.1
Ireland	50.4	1.7	49.0	2.6	52.0	2.3	68.3	2.1	50.4	2.6	32.8	3.9												
Northern Ireland	52.2	2.2	52.0	3.6	54.6	2.9	68.7	3.2	55.7	3.6	33.4	4.5	45.7	3.1	50.8	6.4	45.5	3.8	62.7	3.5	45.7	5.1	30.8	7.3
Scotland	53.2	1.3	53.8	2.0	53.5	1.7	71.3	1.8	50.5	2.0	39.3	2.8	40.8	1.7	43.6	3.8	40.7	2.0	62.7	2.1	39.5	2.4	23.5	4.2
Wales	49.1	1.8	47.2	2.7	51.3	2.4	65.8	2.6	48.2	2.9	34.3	3.7												

* Age adjusted.

With 5-year relative survival between 89% (Austria and Spain) and 59% (Czech Republic), and 10-year relative survival between 74.5% (Switzerland) and 40% (Czech Republic, Slovenia), inter-country variation in survival was strongest for prostate cancer amongst all cancers assessed (Table 2e). Also, the gradient between 5- and 10-year relative survival was much stronger than for most other forms of cancer, which reflects the relatively high proportion of late deaths amongst patients with prostate cancer. With the exception of Slovenia, 5-year relative survival ranged between 79% and 89% in all countries from Northern, Central and Southern Europe included in this analysis. Levels between 71% and 78% were observed in the populations from the UK and Ireland and in Poland, and lower levels were seen in Slovenia (63%) and the Czech Republic (59%). Ten-year relative survival was highest in the Central European countries. Both 5- and 10-year relative survival were rather similar in age groups <60 and 60–74, and considerably lower in age group 75–99 years in most countries.

For kidney cancer, highest survival rates were seen for Austria and Spain, and lowest survival rates were seen amongst the populations from the UK and Ireland (Table 2f). The Eastern European countries showed 5- and 10-year relative survival rates close to those in the Northern European countries. No consistent differences were seen between male and female patients. The survival disadvantage of patients from the UK and Ireland was particularly pronounced in age group 75–99 years, where 5-year relative survival was between 32% and 36%, as compared to 58–68% in age group 15–59 years. However, in the interpretation of the results for this form of cancer, the relatively large standard errors in some of the subgroup analyses warrant particular caution.

Five-year relative survival of patients with non-Hodgkin-lymphoma ranged from 62% in Germany to 41% in Poland (Table 2g). Ten-year survival was mostly 10 or more percent units lower, reflecting relatively frequent occurrence of late deaths. In most populations, survival was higher amongst women than amongst men. An opposite pattern was seen for 10-year relative survival in Switzerland, but the relatively large standard errors have to be taken into account. The survival disadvantage of Polish patients compared to patients from other countries was particularly pronounced in the oldest age group.

Table 3 shows the pan-European estimates of 1-, 5- and 10-year relative survival for all 45 forms of cancer included in the EUROCARE-4 study. In 2000–2002, 5-year relative survival exceeded 95% for testis cancer, 90% for lip cancer and 85% for thyroid cancer and skin melanoma. Levels slightly above or just below 80% were achieved for breast, prostate and endometrial cancers and Hodgkin's disease. On the other end of the spectrum, 5-year relative survival remained as low as 10% for oesophagus and liver cancers, and 5–7% for pancreas and pleura cancers. Ten-year relative survival was 94% for testicular cancer, and between 82% and 87% for lip cancer, skin melanoma and thyroid cancer. On the other hand, 10-year relative survival was still below 10% in 2000–2002 for cancers of the oesophagus, liver, pancreas, lung, and pleura.

4. Discussion

In this article, we provide, for the first time, a detailed comparative analysis of cancer survival by age and sex between European countries, using the period analysis methodology. We thereby extend a previous summary report that had exclusively reported overall 5-year period survival in 2000–2002 in the European countries for a selection of cancer sites and overall trends (all ages and sexes combined) in cancer survival for Europe as a whole.[10] In addition to age- and sex-specific estimates for the most common cancer sites, overall pan-European estimates of 1-, 5- and 10-year survival are given for each of the 45 forms of cancer included in the EUROCARE-4 study. Our analysis which is exclusively focused on survival experience in 2000–2002 indicates persistent large differences in cancer survival between European countries and by age, as well as minor differences by sex for most forms of cancer. Nevertheless, the between country variation seems to be slightly less pronounced than in the previous EUROCARE analyses.[4,17,18]

In general, long-term survival of cancer patients in Northern, Central and Southern Europe was substantially higher than in the UK and Ireland and Eastern Europe. However, there was also substantial variation within these major regions. For example, amongst Southern European countries, cancer survival in Slovenia was still much lower than in Italy and Spain. There is no doubt that countries' economic situation, and the resources that can be and actually are spent for medical care account for much of the variation in cancer survival between European countries, and is likely to be the main explanation for the lower survival rates that are still seen in the Eastern countries.[19] However, the persisting relatively low survival rates, despite the high economic development, in the UK and Ireland, points to the importance of other factors, such as the structure of the health care system, or patterns of risk factors and co-morbidity.

On the basis of relatively poor survival rates in the UK compared to other European countries in the previous rounds of the EUROCARE study, a national plan for investment and reform in cancer care has been launched in the UK in the year 2000.[1] The persisting substantial survival disadvantage of cancer patients in the UK first disclosed in the summary reports of the EUROCARE-4 study in August 2007[4,10] have provoked a major debate on the success or failure of this national cancer plan.[20] However, most of the EUROCARE-4 analyses still pertain to patients diagnosed in 1995–1999, who could not possibly have had any benefits from a cancer plan launched in 2000. Even the period estimates reported in the previous summary report and in this article which refer to the 2000–2002 calendar period, hardly could disclose any potential catch-up of the UK due to this cancer plan. On the one hand, despite restriction of the survival experience in 2000–2002, even the period analyses to a large extent reflect survival of patients with first diagnosis and initial therapy prior to 2000. On the other hand, even the best cancer plan would be expected to show its full impact on long-term cancer survival only some minimum latency period after its introduction. Therefore, any judgment of the UK cancer plan based on the present data would be highly premature and

Table 3 – Period estimates (PEs) of 1-, 5-, and 10-year age-adjusted relative survival by cancer site for Europe as a whole, and corresponding standard errors (SEs).

Cancer site	1-year relative survival		5-year relative survival		10-year relative survival	
	PE	SE	PE	SE	PE	SE
Lip	98.3	1.1	93.6	2.3	86.9	3.8
Tongue	73.8	2.3	51.1	2.1	45.2	3.1
Major salivary gland	85.3	1.8	63.6	3.0	58.0	3.8
Oral cavity	76.3	1.3	49.8	1.7	41.8	2.6
Nasopharynx	75.0	2.4	48.0	2.5	41.2	3.0
Oropharynx	71.9	1.8	41.5	2.7	32.8	4.4
Hypopharynx	58.5	2.5	25.5	2.3	17.1	2.8
Head and neck	72.0	0.8	44.4	1.0	36.5	1.5
Oesophagus	37.5	0.9	10.3	0.6	8.1	0.7
Stomach	46.7	0.6	23.4	0.5	20.3	0.6
Small intestine	65.4	2.0	43.7	2.1	37.0	3.1
Colon and rectum	78.1	0.2	56.8	0.3	52.6	0.5
Colon	76.5	0.3	56.7	0.4	53.3	0.6
Rectum	81.1	0.4	57.1	0.6	51.7	0.8
Liver	33.5	1.0	9.8	0.7	6.3	0.6
Biliary tract	36.7	1.1	14.4	0.8	11.1	0.9
Pancreas	22.2	0.6	5.2	0.4	4.2	0.4
Nasal cavities	79.4	2.2	47.0	3.1	36.6	4.6
Larynx	86.5	0.9	67.3	1.4	55.5	2.4
Lung, bronchus, trachea	36.9	0.3	12.0	0.2	8.7	0.2
Pleura	41.4	1.6	6.8	0.9	2.5	0.5
Bone	78.5	2.3	60.1	2.8	52.9	3.3
Soft tissue	80.5	1.2	60.6	1.5	54.0	1.7
Skin melanoma	97.0	0.2	86.3	0.5	82.8	0.9
Breast	95.4	0.2	82.2	0.3	71.6	0.5
Cervix	84.3	0.8	65.2	1.0	59.0	1.2
Corpus uteri	91.7	0.4	78.1	0.8	75.8	1.2
Ovary	68.6	0.7	36.5	0.8	27.9	0.9
Vagina and vulva	83.3	1.2	60.2	2.0	52.8	2.5
Prostate	95.2	0.2	79.7	0.5	65.2	0.9
Testis	98.2	0.3	95.6	0.5	94.3	0.9
Penis	87.1	2.0	69.8	3.4	61.6	4.8
Kidney	72.5	0.6	55.1	0.8	48.6	1.1
Bladder	83.7	0.4	67.3	0.6	59.1	0.8
Choroid. melanoma	92.8	2.7	64.8	4.2	57.2	5.7
Brain	44.9	0.8	19.6	0.7	12.8	0.6
Thyroid	89.1	0.8	85.5	1.1	81.9	1.6
Hodgkin disease	90.4	0.8	81.4	1.0	76.7	1.4
Non-Hodgkin lymphoma	73.2	0.6	53.6	0.7	41.8	0.9
Multiple mieloma	74.9	0.8	35.9	1.0	18.7	1.0
Leukemia	64.6	0.7	43.4	0.8	30.3	0.9
ALL	59.5	2.7	28.8	2.5	–	–
CLL	89.1	0.8	70.2	1.3	48.6	1.8
AML	34.2	1.2	15.8	1.0	13.0	1.0
CML	74.5	1.6	37.2	2.0	18.1	1.8
Myelodysplastic Syndromes	65.1	3.1	33.1	3.1	–	–
All sites	67.3	0.1	48.3	0.1	42.5	0.2

ALL, acute lymphoblastic leukemia; CLL, chronic lymphocytic leukemia; AML, acute myeloblastic leukemia; CML, chronic myelocytic leukemia.

invalid. The period analysis methodology should be very helpful, however, to disclose potential success or failure of the catch-up of cancer survival rates in the UK with respect to the survival rates from other affluent European countries in the future.

Apart from factors determining cancer care and cancer survival in general, factors related to survival of patients with specific forms of cancer deserve careful consideration. For stomach cancer, the proportion of cancers located in the distal stomach versus the cardia, which is strongly related to prevalence of infection with the gastric bacterium *Helicobacter pylori*, is an important determinant of survival rates.[21] *H. pylori* infection is the key risk factor for distal gastric cancer,[22] which has a better prognosis than cardia cancer.[21] As *H. pylori* prevalence is particularly high in the older generation and in Eastern Europe,[23] a higher proportion of distal gastric cancers in older patients and in Eastern countries may partly explain why the age gradient and the regional gradient are somewhat less pronounced for this form of cancer compared to other cancers.

Persisting survival differences amongst patients with colorectal cancer are likely to be related to differences in treatment rather than early detection, given that organised colorectal cancer screening programmes were still rare in the period under study. Apart from potential under-treatment of elderly patients,[24] the persistent age gradient in colorectal cancer survival may also reflect the adverse impact of comorbidity on prognosis.[25]

Survival of patients with lung cancer remains very poor even in the early 21st century. The main risk factor of this cancer, smoking, is known for more than fifty years, and reducing smoking in the population remains the primary and most important approach to reduce the toll of this deadly disease in all countries.[26]

For breast cancer, inter-country differences in survival in the early 21st century are likely to be partly explained by a mix of differences in early detection and quality of care.[27] In particular, intensive mammographic screening in some countries is expected to lead to an increase in the number and proportion of early stage cancers, with increased survival rates due to both better chances of cure and lead or length-time bias. This mainly concerns age groups 15–59 and 60–74 in our analysis, which encompass the age range in which screening is typically recommended (50–69). However, major differences in survival between countries were also seen in age group 75–99 years, with considerably lower survival in the Eastern countries than in the other countries. This result is unlikely to be explained by screening intensity, but may reflect persistent differences in diagnosis and treatment even in the early 21st century.[28]

Survival of patients with prostate cancer is highly determined by the intensity of prostate specific antigen (PSA) testing which has strongly increased in many European countries in the past years and which typically goes along with a strong increase in prostate cancer detection rates and some overdiagnosis of clinically irrelevant disease. In our study, very high survival was observed in Austria, where PSA testing has been more intensively propagated and practiced than in other European countries in the early 21st century.[29]

A trend towards more favourable stage distribution of renal cancer in the past two decades has been reported[30] which may well explain the higher survival rates found in our study in the 2000–2002 period compared to the previous EUROCARE analyses. There has been no systematic screening for renal cancer, but renal cancer is increasingly detected incidentally, e.g. during abdominal ultrasound examination. In the absence of data on cancer stage in the EUROCARE database, the contribution of earlier diagnosis to the survival differences between countries cannot be quantitatively assessed in our study.

Advances in therapy (high-dose chemotherapy, autologous stem-cell reconstitution and monoclonal antibody therapy) have enhanced perspectives of long-term survival of patients with NHL in the past two decades[31] and most likely explain the increase in survival compared to the previous EUROCARE analyses. The differences in survival between countries may be explained by differences in the speed of dissemination of novel therapies. For example, in contrast to other malignancies, survival rates of patients with NHL were highest in Germany, where some of the key clinical trials on novel therapies have been coordinated.[32]

In the interpretation of our study, a number of limitations have to be kept in mind. Not all European countries could be included, and some of the included countries, such as Germany or Spain, were represented by relatively small parts of the country only. Furthermore, as pointed out previously,[10] potential differences in completeness and quality of data between registries have to be taken into account. Although period analysis provides more up-to-date estimates of long-term cancer survival than traditional cohort-based survival analysis, even the period estimates tend to be too pessimistic in case of ongoing improvement in survival.[6,7,9,33] Period estimates of 5-year survival typically predict 5-year survival later observed for patients diagnosed in the period of interest very well, but predictions become less accurate and occasionally substantially too low for longer-term survival, such as 10-year survival. Furthermore, data were available up to 2002 only, and our analyses could therefore not capture any further progress made in the more recent years. Most cancer patients diagnosed today therefore most likely have higher survival expectations than reflected in our figures. Nevertheless, our period survival figures provide the most up-to-date comparative survival estimates for European countries available to date.

Due to the lack of data on mode of cancer detection, cancer stage at diagnosis and cancer treatment in the EUROCARE database, the reasons for the survival differences between countries cannot be derived from the database itself. Rather, interpretation has to consider relevant information from other sources.

Despite these limitations, the implementation of the period analysis methodology in the fourth round of the EUROCARE study makes an important contribution to more up-to-date information on the cancer survival in European countries. We hope that this innovation may strongly enhance the use of EUROCARE results by clinicians, patients, public health officials and the public as pointed out in a first reflection after appearance of the first EUROCARE period survival estimates.[34] Further attempts should be made to reduce the delay in availability of cancer registry data, and to speed up analysis and publication in the future.

Conflict of interest statement

None declared.

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