Chapter 3

World standard cancer patient populations: A resource for comparative analysis of survival data

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Introduction

As noted in Chapter 2 'Statistical methods for the analysis of cancer survival data', cancer patient survival is influenced by age in two ways: the risk of dying as a result of the cancer with which a patient has been diagnosed tends to be greater for elderly persons, and elderly subjects tend to be at greater risk of death from other causes. In comparing two groups of subjects, one of which has a larger proportion of elderly patients than the other, the relatively greater risk of death from causes other than the cancer under study will be reflected in a lower value for expected survival in the older group. However, relative survival is determined by deaths from the cancer under study as well as other causes of death. In these circumstances, comparisons of relative survival within age bands can be recommended. However, it is common for investigators to seek to summarize differences between groups using overall estimates of survival. For this purpose, direct standardization of relative survival estimates has been advocated (Parkin & Hakulinen, 1991). In the EUROCARE study, for example, the data from all registries were combined, within categories of tumour site, in order to establish the standard populations of persons registered with cancer to which individual registry survival estimates were standardized (Berrino *et al.*, 1995). This approach was not possible in the present study, since we wished to make comparisons between the developing country populations and published data for European and US populations. For this reason, we constructed a set of abstract World Standard Cancer Patient Populations for use in the present study and, we hope, other comparative studies of cancer survival.

Data and methods

We obtained global estimates of incidence rates of major cancers in 1985 from Parkin *et al.* (1993). The data were in the form of rates for the age groups 15–44, 45–54, 55–64 and 65+. In order to provide standard populations for the more detailed five-year age groups (0–4, 5–9, ..., 85+), we used polynomial regression models to estimate incidence rates for intermediate points in the age range 15–64. Worldwide incidence rates for childhood cancer were obtained from Parkin *et al.* (1988). For age groups from 65–69 to 85+, incidence rates were estimated by linear projection of the trend in incidence between the point estimates of rates at ages 55–59 and 60–64. These incidence rates were then applied to United Nations estimates of the total world population in 1985 (UN, 1991) to obtain estimates of annual numbers of new cases. Finally, for each cancer site, percentages of cases in each age group were calculated.

Results

The standard populations (in percentage terms) are presented in Table 1.

Discussion

As described in Chapter 2, the standard populations are required for direct standardization (i.e. by summing age-specific relative survival estimates weighted by the standard percentages). The standard populations presented are approximations to the true age distributions of new cases of cancer globally. The accuracy of the estimates is not of great concern, since the intention is that they should be used in the intermediate calculations necessary to calculate age-standardized relative survival. Further refinements would not have any material bearing on such results. The regression method used to obtain age-specific estimates of global incidence rates imposes a degree of smoothing on the proportions. Therefore their use is unlikely to produce distorted standardized survival

Table 1. World standard cancer patient populations (percentages): males and females combined

Age	Tumour site (ICD-9 codes)									
	140–208	140–149	150	151	153–154	155	157	161	162	172
0–4	0.5	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
5–9	0.6	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
10–14	0.7	0.4	0.0	0.0	0.1	0.4	0.0	0.1	0.0	0.4
15–19	0.9	0.7	0.1	0.1	0.2	0.8	0.0	0.2	0.1	0.9
20–24	1.3	1.2	0.2	0.2	0.4	1.3	0.1	0.4	0.2	1.8
25–29	1.8	1.9	0.5	0.7	0.8	2.1	0.4	0.9	0.5	3.3
30–34	2.5	3.1	1.4	1.7	1.5	3.2	1.3	1.7	1.1	4.9
35–39	3.4	4.6	3.1	3.6	2.3	4.7	3.2	3.0	2.1	6.6
40–44	4.7	6.5	5.3	5.7	3.4	6.5	5.3	5.1	3.6	7.8
45–49	6.3	8.6	7.5	7.3	4.7	8.3	6.6	7.7	5.6	8.7
50–54	8.0	10.5	9.1	8.2	6.1	10.0	7.1	10.7	8.0	9.0
55–59	9.7	11.9	10.3	8.6	7.5	11.1	7.5	13.2	10.4	8.9
60–64	10.5	11.2	12.4	10.8	9.5	11.6	9.9	12.9	12.6	9.1
65–69	10.5	10.0	11.8	11.0	10.6	10.2	10.6	11.5	12.3	8.7
70–74	10.3	8.9	11.0	10.9	11.7	9.0	11.2	10.1	11.9	8.3
75–79	9.9	7.8	10.1	10.7	12.8	7.8	11.8	8.7	11.3	7.8
80–84	9.5	6.8	9.1	10.5	13.8	6.8	12.2	7.4	10.5	7.2
85+	8.9	5.6	8.2	10.0	14.6	5.8	12.8	6.4	9.8	6.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Age	Tumour site (ICD-9 codes)									
	174	180	182	183	185	186	188	189	200-203	204-208
0-4	0.0	0.0	0.0	0.2	0.0	0.6	0.0	4.5	2.8	8.1
5-9	0.0	0.0	0.0	0.4	0.0	0.1	0.0	2.1	2.7	6.3
10-14	0.1	0.1	0.1	0.7	0.0	0.1	0.1	1.3	2.7	5.3
15-19	0.3	0.3	0.2	1.1	0.0	3.8	0.2	1.0	2.8	4.6
20-24	0.9	1.1	0.4	1.9	0.0	12.5	0.4	1.0	3.1	4.3
25-29	2.1	2.7	0.8	2.9	0.0	18.6	0.6	1.3	3.5	4.1
30-34	4.0	5.2	1.6	4.2	0.1	19.0	1.1	1.6	4.0	4.2
35-39	6.4	8.2	3.0	5.8	0.2	16.1	1.8	2.3	4.6	4.3
40-44	8.5	10.8	5.1	7.5	0.3	9.8	2.8	3.5	5.4	4.5
45-49	10.0	12.1	7.9	9.0	0.8	6.3	4.2	5.3	6.2	4.8
50-54	10.5	12.0	11.0	10.2	1.6	3.9	6.0	7.7	7.0	5.2
55-59	10.2	10.9	13.6	10.9	3.3	2.9	7.9	10.6	7.7	5.6
60-64	9.7	9.8	13.6	10.4	6.2	1.8	10.0	10.9	8.5	6.2
65-69	9.0	8.0	11.7	9.2	8.7	1.3	11.1	10.6	8.4	6.4
70-74	8.2	6.5	9.9	8.0	12.1	1.1	12.2	10.1	8.2	6.6
75-79	7.5	5.2	8.3	6.9	16.4	0.9	13.1	9.4	7.9	6.6
80-84	6.7	4.1	6.9	5.9	21.8	0.7	13.9	8.8	7.5	6.6
85+	5.9	3.0	5.9	4.8	28.5	0.5	14.6	8.0	**7.0**	**6.3**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

values, as long as there is reasonable precision in the original estimates of age-specific relative survival. If the original survival data are very sparse, it may be wise to combine them in larger age groups, for which the standard proportions can be combined additively. A further recommendation would be to show a truncated standardized relative survival, say to age 74, as we have done in the present report. If an investigator wishes to standardize data for a cancer which has not been included in the tables, then it would be a reasonable approach to choose a set of proportions for a similar type of cancer, or for all cancer combined. It should be noted that the site-specific cancer patient populations are not suitable for comparisons of survival of patients in a single population with different types of cancer. If this is an aim of a particular study, then, again, the standard populations given in Table 1 for all cancers combined should be used.

The effect of standardizing using a worldwide standard is that greater weight is given to younger patients than would be the case if an age distribution based on developed countries only had been used. For developed countries in which elderly cancer patients predominate, use of the World Standard Cancer Patient Populations tends to raise the age-standardized relative survival above the unstandardized value. The interpretation of results of this kind is that they indicate the overall relative survival which would pertain if the developed country's age-specific survival values applied in a 'worldwide average' group of patients. This may seem artificial but, in the spirit of the World Standard Population (Segi, 1960), which has now gained universal acceptance, use of the World Standard Cancer Patient Populations will enhance the comparability of survival results published by individual cancer registries.

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