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Estimation of colorectal cancer prevalence in France

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Abstract

The prevalence in France of patients with colorectal cancer was estimated using data from five population-based cancer registries. At the end of 1994, the number of cases diagnosed in France no more than 5 years before was approximately 95 000, of whom 12 180 had suffered metastasis and 9746 a local recurrence. This type of cancer is the most common in both men and women and these results enable the need for care or surveillance to be evaluated more accurately. © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Incidence and mortality are valuable indicators with regard to cancer epidemiology. Their use is nevertheless more limited when the objective is the evaluation of healthcare requirements. In this case, it is particularly important to know the number of patients likely to require care. The most pertinent indicator is therefore prevalence. Publications in this field provide total prevalence, i.e. the census of people alive who have had a given cancer, or partial prevalence where this census is restricted to those who have been diagnosed with cancer within a specific length of time. Such publications are available for Great Britain [1], Scandinavian countries [2,3] and Italy [4–6]. Methods of estimation have also been proposed with the aim of calculating the total and partial prevalence in the absence of exhaustive follow-up of incident cases, using either incidence and mortality data or incidence and survival data [7–10]. Such observations or estimations prove to be insufficient for a precise evaluation of the need for care or supervision since it is not possible to know the breakdown of patients according to their health status.

The French network of cancer registries (FRANCIM) has conducted an enquiry to provide, from these data, an evaluation of the prevalence of colorectal tumours in France according to patients' health status.

2. Patients and methods

The data were provided from 1054 cases, selected either randomly or exhaustively from colorectal cancers (coded according to codes C18, C19 and C20 of the International Classification of Diseases (ICD) 10 classification) diagnosed in 1990 and registered in five French population-based cancer registries (Calvados, Doubs, Hérault, Somme and Tarn), which cover 5% of the French population. This sample does not include *in situ* lesions and represents 75% of the colorectal cancer cases diagnosed in 1990 in these five French areas. Table 1 summarises patients' characteristics and statistics concerning the probability of survival for 5 years and the number of patients alive 5 years after diagnosis.

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For each case, a specific survey was carried out to establish how widespread the tumour was at diagnosis and the effect of initial treatment (local remission or not). These data were collected for more than 93% of cases. The date and type of possible relapses (local or not) occurring within 5 years of the date of diagnosis were also recorded. Using the Kaplan–Meier method, we have estimated 5-year overall, local relapse-free, metastatic-free and disease-free survival. Local relapse-free survival is estimated using as the pejorative event either the lack of local remission or a local relapse occurring within 5 years of the date of diagnosis. The dates of the death of patients who died without suffering local relapse were censored at the date of death. Metastatic-free survival was estimated in the same way, using metastatic relapse or the lack of metastatic remission as the pejorative event. Disease-free survival was estimated using as the pejorative event the lack of remission or the earlier of local and metastatic relapse if both occurred.

From data collected in this way, four types of prevalence were estimated at the end of 1994. Partial prevalence at 5 years corresponded to the number of surviving patients diagnosed less than 5 years before. The survival rates observed in the cohort were applied to the estimated number of incident cases nationally [11] divided into four age groups (<60, 60–69, 70–79 and $80+$). We have used the method adopted by Pisani and Ferlay [12] to estimate for the end of year t:

$$PP(t) = \sum_{x=0}^{t-1} I(t-x) \times S(x+0,5) \quad (1)$$

where $PP(t)$ corresponds to partial prevalence at t years, $I(u)$ the number of incident cases during year u and $S(v)$ the age-specific survival rate observed after v year(s).

The prevalence of cases without metastasis after t years has been estimated by applying observed survival and metastatic-free survival rates to the number of patients with a cancer diagnosed less than t years before. The calculation principle uses a combination of survival, i.e.:

$$PPM(t) = \sum_{x=0}^{t-1} I(t-x) \times S(x+0,5) \times SM(x+0,5 \mid VV) \quad (2)$$

where $PPM(t)$ corresponds to the partial prevalence t years after diagnosis for those patients not showing signs of metastatic relapse, $I(u)$ the number of incident cases during year u, $S(v)$ the age-specific survival rate observed after v year(s) and $SM(v \mid VV)$ the proportion of patients without metastasis relapse among survivors (VV) at time v.

Table 1
Patients' characteristics, 5-year overall survival probability and 5-year partial prevalence (date of diagnosis: 1990) ($n=1054$)

Patients' characteristics	Total no. diagnosed (n)	% of total (%)	5-year survival probability	95% CI	Patients alive 5 years after diagnosis (% of total no. of patients surviving) (total $n=420$)
Age (years)					
<60	200	19.0	0.59	0.53–0.66	110 (26.2)
60–69	311	29.5	0.50	0.45–0.56	147 (35.0)
70–79	290	27.5	0.42	0.36–0.47	108 (25.7)
80+	248	23.5	0.26	0.21–0.32	53 (12.6)
Unknown	5	0.5			2 (0.5)
Sex					
Male	584	55.4	0.44	0.38–0.49	232 (55.2)
Female	470	44.6	0.45	0.41–0.50	188 (44.8)
Cancer site					
Colon (ICD 10: C18)	588	55.8	0.47	0.43–0.51	247 (58.8)
Rectosigmoid junction (ICD 10: C19)	169	16.0	0.46	0.38–0.53	67 (16.0)
Rectum (ICD 10: C20)	297	28.2	0.38	0.33–0.44	106 (25.2)
Dukes' stage at diagnosis					
A	159	15.1	0.83	0.77–0.89	114 (27.1)
B	341	32.4	0.62	0.57–0.68	192 (45.7)
C	229	21.7	0.41	0.35–0.48	88 (21.0)
D	244	23.1	0.05	0.02–0.08	12 (2.9)
Unstaged or unknown	81	7.7	0.21	0.12–0.30	14 (3.3)

CI, confidence interval; ICD, International Classification of Diseases.

The number of people suffering from metastatic relapse is easily calculated:

$$PPRM(t) = PP(t) - PPM(t)$$

The same method has been used to estimate the local relapse-free and the disease-free prevalence after t years since diagnosis.

3. Results

3.1. Survival rates and observed prevalent cases

As shown in Table 1, the overall survival rate is lower in the elderly than in younger patients, partly because we did not eliminate those who died from other causes. The survival rate is very low for patients with Dukes' D stage at diagnosis. Most of these patients die within 5 years of diagnosis. The Dukes' stage distribution of the 5-year disease-free survivors is very similar to the distribution of the 5-year survivors in Table 1. There is no statistical difference in overall survival between men and women and between cancer sites. Relapse-free survival, either local or metastatic, took into account initial health status (Table 2). These survival rates are low with disease-free survival probability 5 years after diagnosis estimated at 0.45 (95% confidence interval (CI) 0.42–0.49). Metastatic relapses were more frequent than local relapses.

3.2. Partial prevalence

Estimated prevalence data are given in Table 3. By applying the various survival rates calculated from the data of the survey to estimated incidence data in France, we obtained the number of estimated prevalent cases 5 years after diagnosis, whatever the health of these patients (partial prevalence at 5 years), i.e. approximately 95 000 people in France at the end of 1994. Half of them had been diagnosed less than 3 years before. The number of cases with initial metastasis or with metastatic relapse was estimated at slightly more than 12 000, i.e. 13% of prevalent cases. 59% had been diagnosed less than 3 years earlier. There were approximately 9700 patients with no initial local containment or who suffered local recurrence, i.e 10% of prevalent cases. The proportion of patients whose diagnosis was less than 3 years before is also approximately 60% for this group. A number of cases show evidence of both types of pejorative events, with 18 265 cases suffering from local and/or metastatic relapse. In 1994, the number of deaths in France was approximately 15 400 and the estimated number of new colorectal cancer cases was approximately 32 700, corresponding to a 5-year prevalence/incidence ratio of 3.

Table 2
Observed 5-year survival

Survival	No. of cases where pejorative events occurred	5-year survival probability	95% CI
Overall	576	0.44	0.41–0.47
Local relapse-free	297	0.65	0.61–0.68
Metastatic-free	370	0.56	0.52–0.59
Disease-free	486	0.45	0.42–0.49

CI, confidence interval.

4. Discussion

Estimates of local relapse-free, metastatic-free and disease-free survival have not been calculated separately by age group, due to the relatively low number of cases. We did not establish any correlation between age and Dukes' stage at diagnosis. Furthermore, there was no prevalence of metastatic-free survival in a specific age group. The log-rank test was significant for local relapse-free survival due to the poor survival for the group aged 80 years and over (data not shown). Thus, we may consider that our prevalence estimations are slightly biased when using global relapse-free survivals.

Our estimates allow the health status to be established for people alive suffering or having suffered from a colorectal tumour. Various publications have so far shown the distribution of total prevalence according to the time elapsed after diagnosis. Hence, in Denmark in 1986, partial prevalence at 5 years was evaluated as almost half of the total prevalence [2,3]. Estimations in Italy led to a similar proportion of cases diagnosed within 5 years [5]. By referring to estimations of total prevalence in France according to a method described elsewhere [9], the proportion of cases diagnosed no

Table 3
Estimated number of partial prevalence cases in France (1994) according to health status and time since diagnosis

Time since diagnosis (years)	Partial prevalence n (%)	Metastatic relapse n (%)	Local relapse n (%)	Local and/or metastatic relapse n (%)
0–2	48 149 (50)	7241 (59)	5823 (60)	10 402 (57)
3–5	47 232 (50)	4939 (41)	3923 (40)	7863 (43)
0–5	95 381	12 180	9746	18 265

more than 5 years before was evaluated at 50% in 1994. Our results show that a majority of patients in the 5-year prevalent group are stabilised in complete remission (80%). This proportion is certainly greater with respect to total prevalence. This hypothesis is confirmed elsewhere by the fact that people living in relapse are more numerous in the first 2 years after diagnosis than during the following 3 years. The development of colorectal cancer varies greatly according to the site of the cancer, although in our sample the distribution of patients alive 5 years after diagnosis according to cancer site is the same as the distribution of patients at the time of diagnosis. Nevertheless, it would be interesting to study other colic sites (right or left colon, rectosigmoid, rectum) separately. Such a detailed approach has not been developed in our study because of the low number of pejorative events (recurrences) observed and because our colorectal incidence estimations for France could not distinguish between cancer subsites.

With regard to the choice of estimation method, the comparison of estimations and observations inside the studied cohort is completely satisfactory. Obviously, estimations on a national level rely on a hypothesis of relative homogeneity of stages of diagnosis and initial treatment in France, which is very important for patients' potential survival rate [13]. A recent study has shown that treatment in terms of surgery is relatively homogeneous in France [14]. There are more discrepancies where the use of chemotherapy and radiotherapy is considered [15,16]. Nevertheless, these disparities have implicitly been taken into account owing to the number and geographical distribution of the cancer registries involved in this study. Our sample included approximately 23% of patients with Dukes' D stage at diagnosis. Most of them died within 5 years. The value of actions aiming to anticipate diagnoses in order to treat patients as early as possible is once more shown by observations made about what happens to patients according to which group they initially belonged.

This kind of study supports estimated prevalence reports elsewhere. It would be interesting to carry it out on an European level as the second phase of the project, in the same way as with the EUROPREVAL study.

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