Emergency admission for cancer: a matter of survival?

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Summary The objective of this study was to compare the pre-hospital health care process, clinical characteristics at admission and survival of patients with a digestive tract cancer first admitted to hospital either electively or via the emergency department. The study involved cross-sectional analysis of information elicited through personal interview and prospective follow-up. The setting was a 450-bed public teaching hospital primarily serving a low-income area of Barcelona, Catalonia, Spain. Two hundred and forty-eight symptomatic patients were studied, who had cancer of the oesophagus (n = 31), stomach (n = 70), colon (n = 82) and rectum (n = 65). The main outcome measures were stage, type and intention of treatment and time elapsed from admission to surgery; the relative risk of death was calculated using Cox’s regression. There were 161 (65%) patients admitted via the emergency department and 87 (35%) electively. The type of physician seen at the first pre-hospital visit had more often been a general practitioner in the emergency than in the elective group (89% vs 75%, P < 0.01). Emergency patients had seen a lower number of physicians from symptom onset until admission, but two-thirds had made repeated visits to a primary care physician. Emergency patients were less likely to have a localized tumour and a diagnosis of cancer at admission, and surgery as the initial treatment. Median survival was 30 months for elective patients and 8 months for emergency patients (P < 0.001), and the relative risk of death (RR) was 1.83 (95% confidence interval, CI, 1.32–2.54). After adjustment for strong prognostic factors, emergency patients continued to experience a significant excess risk (RR = 1.58; CI 1.10–2.27). In conclusion, in digestive tract cancers, admission to hospital via the emergency department is a clinically important marker of a poorer prognosis. Emergency departments can only partly counterbalance deficiencies in the effectiveness of and integration among the different levels of the health system.

Keywords: gastrointestinal neoplasm; diagnosis; symptoms; emergency presentation; healthcare-seeking behaviour; delay

While substantial knowledge exists on acute problems in cancer patients already under treatment, few studies have analysed the characteristics and prognosis of patients that present to accident and emergency departments with symptoms of undiagnosed malignancy (Brown et al, 1983; Anderson et al, 1992; Hargarten et al, 1992; Wile et al, 1993; Curless et al, 1994; Heys et al, 1994; Mulcahy et al, 1994; Scott et al, 1995; Swenson et al, 1995). With few exceptions, analyses of diagnostic delay in cancer commonly neglect that patients are often admitted to hospital through an emergency department (Holliday and Hardcastle, 1979; Nilsson et al, 1982; MacArthur and Smith, 1984; Ratcliffe et al, 1989; Haugstvedt et al, 1991; Porta et al, 1991; Vineis et al, 1993).

Improving referral systems from primary care to hospitals, as well as the effectiveness of hospital outpatient clinics and emergency departments, is a continued challenge (Artal et al, 1991; Hargarten et al, 1992; Joint Council for Clinical Oncology, 1993; Pope, 1993; Mountney et al, 1994; Swenson et al, 1995; Steinbrock, 1996; Tyrance et al, 1996; West and Rosen, 1996). In Spain, as in the UK and other countries, although the National Health System provides universal coverage and free access to primary care, use of emergency departments is high, and about half of all admissions to hospital take place through an emergency department (Ministerio de Sanidad y Consumo, 1995; West and Rosen, 1996). This fact sharply contrasts with the notion that, if the integration of the different levels of care was optimal, the vast majority of admissions to a hospital ward ought to be elective, booked, planned or ‘direct’ (e.g. via the outpatient clinic or an appropriate appointment) (West and Rosen, 1996). Theoretically, this should be particularly true for cancer: disease onset is commonly progressive, most symptoms should drive patients to primary care physicians and an orderly referral process should make it unnecessary to use the emergency department, except in a minority of cases (Brown et al, 1983; Hargarten et al, 1992; Joint Council for Clinical Oncology, 1993; Calman, 1995; Selby et al, 1996). By contrast, almost half of all patients with cancer first admitted to our hospital did so via the emergency department (63% of first admissions for lung cancer, 28% for breast cancer, 52% for colorectal cancer, 49% for stomach cancer, 55% for liver cancer and 54% for bladder cancer) (Casamitjana et al, 1996). Lower, but nevertheless significant, figures have been reported from other settings (Holliday and Hardcastle, 1979; Nilsson et al, 1982; Fielding et al, 1989; Ratcliffe et al, 1989; Haugstvedt et al, 1991; Anderson et al, 1992; Hargarten et al, 1992; Vineis et al, 1993; Wile et al, 1993; Curless et al, 1994; Heys et al, 1994; Mountney et al, 1994; Mulcahy et al, 1994; Scott et al, 1995). Factors and processes that contribute to this situation may include: a suboptimal integration among levels of care, the ‘waiting iceberg’ (e.g. waiting times for outpatient and inpatient appointments) (Pope, 1993), general practitioners’ diagnostic and referral
patterns, patients' health care-seeking practices and the relative
unspecificity of early symptoms of cancer (MacArthur and Smith,
1984; Porta et al, 1991; Joint Council for Clinical Oncology, 1993;
Porta et al, 1996a).

Concern about the use of hospital emergency facilities by
undiagnosed cancer patients would be further justified if it had a
detrimental effect upon survival. There is indeed some evidence
that this might be the case (Brown et al, 1983; Fielding et al, 1989;
Anderson et al, 1992; Hargarten et al, 1992; Wile et al, 1993;
Mountney et al, 1994; Mulcahy et al, 1994; Scott et al, 1995).

Interest in the pre-diagnostic phases of cancer led us to design a
study on the process followed between onset of symptoms and
diagnosis by patients with cancer of the digestive tract (Bellloc et
al, 1994; Molina et al, 1994; Malats et al, 1995; Porta et al, 1996a
and b). The primary aims of this report are: firstly, to compare the
pre-hospital health care process followed by patients first admitted
through the emergency department and by patients whose admis-
sion was elective; secondly, to analyse the clinical characteristics
of the two groups at the time of diagnosis, as well as the type,
timing and intention of treatment; and, thirdly, to analyse the
association between mode of admission and survival.

SUBJECTS AND METHODS

The study took place in the Hospital del Mar, a 450-bed public
teaching hospital primarily serving a low-income area of Barcelona.
The hospital's Emergency Department attends approximately
107,000 visits annually. Almost 59% of all 15,024 annual admis-
sions to hospital occur via the emergency department. In Spain's
public hospitals the admission is always ordered by a hospital staff-
physician, and it can essentially take place either after the patient
presenting to the emergency department or can be elective (i.e. from
the outpatient clinic to the hospital ward). All symptomatic patients
first hospitalized for a cancer of the oesophagus, stomach, colon or
rectum first treated in the hospital were eligible for inclusion.
Patients were identified through the admission registry and by daily
contacts with the appropriate hospital departments. There were two
periods of inclusion: February 1987–February 1989 and June
1991–January 1992 (Bellloc et al, 1994; Molina et al, 1994; Malats
et al, 1995; Porta et al, 1996a and b). Of 285 patients eligible for
inclusion in the study, 251 (88%) were personally interviewed;
failure to conduct the interview was largely as a result of the
patient's premature death (27 patients). Interviews were conducted
by one of three physicians, who were not involved in the care of the
study patients. Over 92% of the interviews took place during the
hospital stay and the rest during the first follow-up visit after
discharge, in the hospital's outpatient clinic.

Patients were administered a structured questionnaire designed
to elicit initial symptoms of digestive cancer (Bellloc et al, 1994;
Molina et al, 1994; Malats et al, 1995; Porta et al, 1996a and b).
Patients were asked when they had first felt ill, and what signs or
symptoms they experienced at the time. The sign or symptom
hence spontaneously reported was labelled as the 'first symptom
according to the patient'. They were then asked about each of a
check-list of signs and symptoms commonly occurring in cancer
of the digestive tract, and the corresponding dates of onset were
registered. The physician-interviewer assessed whether each
symptom was likely to be attributable to the cancer, and the
symptom that occurred earlier was labelled as the 'first medical
symptom'. Agreement existed between the patient and the physician-interviewer on the type of first symptom in 86% of cases. For

the purposes of analysis, the first medical sign or symptom was
grouped in one of five broad categories: 'upper digestive tract
symptoms' (dysphagia, odynophagia, haematemeses, nausea,
vomiting, melena), 'lower digestive tract symptoms' (rectal
bleeding, constipation, altered bowel habit, diarrhoea, rectal
tenesmus), 'constitutional syndrome' (asthenia, anorexia, weight
loss), 'abdominal pain' and 'other signs or symptoms' (dyspepsia,
retrosternal pyrosis, epigastric mass, supraclavicular mass, other
type of pain). Patients were also asked when, why and where they
first saw a physician in relation to the cancer, as well as the
number of doctors visited between the initial consultation and the
hospitalization. The person who took the initiative of referring to
the emergency department was also elicited from the interview.

Tumour characteristics (stage, pathology), selected treatment
features (type, intention), the tentative or suspicion diagnosis at
admission, and the final or certainty diagnosis were recorded from
clinical notes. The intention of treatment was deemed radical if the
surgery considered that there was no macroscopic residual tumour
once resection had been completed and if microscopic examination
indicated that resection margins were tumour-free; treatment inten-
tion was classified as palliative when resection was carried out in the
presence of distant metastases or when inadequate local clearance
was achieved. The primary independent variable of the study was
the mode of admission to hospital (emergency vs elective), also as
recorded in clinical notes; three patients who lacked information
on mode of admission were excluded from the present analysis.

Survival was defined as the time elapsed between the date of diag-
nosis and the date of the last registered entry of the patient (death by
any cause, last control or the cut-off date for the analysis, if still
alive). Over 2 years after the last patient entry, the database was
updated and a 97% patient follow-up was achieved; 73 patients
were alive and 175 (71%) had died. The median follow-up was 55 months
for patients alive at the end of follow-up (mean 46.7 months) and
6 months for non-censored patients (mean 11.4 months).

Statistical analyses

In contingency tables, the chi-square test for homogeneity or inde-
pendence ($X^2$) and Mantel–Haenszel $X^2$ test for linear trend were
applied to assess the relationship between two qualitative or categori-
 cal variables. When $\geq 20\%$ of cells had expected counts of less than five,
 Fisher's exact test was used (Armitage and Berry, 1987). Student's $t$-test was used to determine the relationship between a
categorical variable with two levels and a normally distributed quan-
titative variable, and Mann–Whitney's $U$-test for non-normally
distributed variables (Siegel and Castellan, 1988). Allowance for
potential confounding variables was performed by unconditional
logistic regression analysis (Kleinbaum et al, 1982; Egret, 1991).

Five-year survival probability rates and survival curves were esti-
 mated using the Kaplan–Meier method (Kaplan and Meier, 1958),
and the homogeneity of curves was assessed using the log-rank test
(Cox, 1972). Crude and covariate-adjusted hazard ratios, as estimates
of the relative risk of death (RR), with their corresponding 95%
confidence intervals (CI) were calculated by means of Cox's propor-
tional hazards regression (Cox and Oakes, 1984; Egret, 1991; Collet,
1994). Although no notable differences were found between the
baseline characteristics of patients according to their period or series
of inclusion, a term indicating the series was included in all models.
The RR of several potential explanatory and confounding variables
were estimated in variable-specific models, which also included age,
gender, cancer site and stage. The variables selected after these
analyses were used to adjust nested models, fitted after considering the changes in the RR and the improvement in the goodness-of-fit of the model (Clayton and Hills, 1993; Collet, 1994). The assumption of proportional hazards was checked and confirmed for each variable by means of the statistical significance of its interaction with time (Kalbfleisch and Prentice, 1980; Collet, 1994).

### RESULTS

The study included 248 patients with cancer of the digestive tract (oesophagus, \( n = 31 \); stomach, \( n = 70 \); colon, \( n = 82 \); and rectum, \( n = 65 \)). The patients’ mean age was 67.7 years (standard deviation 12.0) and their socioeconomic status was low (81% in social classes IV or V). Sixty-five per cent (\( n = 161 \)) were admitted through the emergency department. The initiative of the visit to the emergency department belonged to the patient himself in 16% of cases, to a relative or friend in 21%, to the physician seen at the first medical visit in 32% and to another physician in 32%. Overall, 22 of the 161 (14%) patients that presented to the emergency department did so at the initiative of a member of the staff of the study hospital.

Patient and disease characteristics, as well as information on the health care process from symptom onset until admission to hospital are shown in Table 1 by mode of admission. Tumour histology \( (P = 0.91) \) and primary site \( (P = 0.19) \) were equally distributed in the two groups, although elective admissions were slightly more common in rectal cancer. Components of the ‘constitutional syndrome’ (asthenia, anorexia, weight loss) were more frequently reported as initial symptoms by emergency patients, whereas lower digestive symptoms were more common among elective admissions \( (P < 0.01) \).

The first symptom of cancer triggered a medical visit less often among emergency patients \( (P < 0.01) \) (Table 1). The first medical visit had taken place slightly more frequently in an emergency setting among patients presenting to the emergency department; however, less than 15% of such first visits in an emergency setting
Table 3  Median survival time, 5-year probability of survival and relative risk of death by type of admission and selected variables

| Type of admission | Median survival (months) | 5-year survival probability* (95% CI) | P (log-rank test) | Relative risk of death* (95% CI) |
|-------------------|--------------------------|----------------------------------------|------------------|----------------------------------|
| Elective          | 30.1                     | 0.34 (0.23-0.46)                       | 1*               |                                  |
| Emergency         | 8.2                      | 0.19 (0.13-0.27)                       | < 0.01           | 1.61 (1.15-2.25)                 |
| Gender            |                          |                                        |                  |                                  |
| Male              | 12.3                     | 0.24 (0.17-0.32)                       | 1*               |                                  |
| Female            | 13.4                     | 0.25 (0.16-0.36)                       | 0.651            | 1.07 (0.76-1.48)                 |
| Age (years)       |                          |                                        |                  |                                  |
| < 65              | 20.2                     | 0.34 (0.24-0.44)                       | 1*               |                                  |
| 66–75             | 10.2                     | 0.23 (0.14-0.35)                       | 1.90 (1.26-2.85) |                                  |
| ≥ 76              | 8.9                      | 0.14 (0.06-0.24)                       | 0.011            | 2.86 (1.92-4.23)                 |
| Social class      |                          |                                        |                  |                                  |
| I–II              | 35.8                     | 0.48 (0.22-0.70)                       | 1*               |                                  |
| III               | 16.5                     | 0.36 (0.19-0.54)                       | 1.24 (0.53-2.86) |                                  |
| IV–V              | 11.0                     | 0.20 (0.14-0.28)                       | 1.36 (0.65-2.81) |                                  |
| Tumour site       |                          |                                        |                  |                                  |
| Oesophagus        | 6.8                      | 0.03 (0.01-0.15)                       | 1*               |                                  |
| Stomach           | 10.0                     | 0.21 (0.12-0.32)                       | 0.32 (0.19-0.55) |                                  |
| Colon             | 16.7                     | 0.32 (0.22-0.44)                       | 0.22 (0.13-0.37) |                                  |
| Rectum            | 20.7                     | 0.28 (0.17-0.40)                       | < 0.01           | 0.25 (0.14-0.42)                 |
| First medical symptom |                      |                                        |                  |                                  |
| Upper digestive   | 7.4                      | 0.12 (0.04-0.25)                       | 1*               |                                  |
| Lower digestive   | 22.9                     | 0.30 (0.19-0.42)                       | 1.30 (0.63-2.68) |                                  |
| Constitutional syndrome |            | 6.2                                     | 0.16 (0.07-0.28) | 1.35 (0.72-2.53)                 |
| Abdominal pain    | 15.5                     | 0.34 (0.22-0.46)                       | 1.27 (0.68-2.38) |                                  |
| Other             | 18.9                     | 0.25 (0.10-0.44)                       | < 0.01           | 0.99 (0.50-1.98)                 |
| First medical visit because of first medical symptom | |                                        |                  |                                  |
| Yes               | 13.8                     | 0.24 (0.17-0.31)                       | 1*               |                                  |
| No                | 8.6                      | 0.26 (0.16-0.38)                       | 1.11 (0.79-1.57) |                                  |
| Type of physician visited (first medical visit) | |                                        |                  |                                  |
| General           | 11.6                     | 0.24 (0.17-0.30)                       | 1*               |                                  |
| Specialist        | 20.5                     | 0.29 (0.12-0.47)                       | 1.15 (0.73-1.80) |                                  |
| Number of physicians visited until admission | |                                        |                  |                                  |
| The first one only | 15.9                    | 0.29 (0.17-0.43)                       | 1*               |                                  |
| One more          | 9.5                      | 0.17 (0.09-0.27)                       | 1.69 (1.13-2.52) |                                  |
| Two more          | 19.0                     | 0.16 (0.02-0.43)                       | 0.98 (0.62-1.53) |                                  |
| ≥ Three more      | 9.0                      | 0.26 (0.13-0.41)                       | 1.12 (0.69-1.81) |                                  |
| Stage             |                          |                                        |                  |                                  |
| Local             | 34.6                     | 0.38 (0.27-0.49)                       | 1*               |                                  |
| Regional          | 15.5                     | 0.22 (0.14-0.31)                       | 1.74 (1.20-2.55) |                                  |
| Disseminated      | 3.2                      | 0.06 (0.02-0.17)                       | < 0.01           | 5.28 (3.43-8.13)                 |
| Type of initial treatment | |                                        |                  |                                  |
| Other than surgery| 3.7                      | 0.04 (0.01-0.13)                       | 1*               |                                  |
| Surgery           | 20.4                     | 0.29 (0.22-0.37)                       | < 0.01           | 0.28 (0.21-0.42)                 |
| Intention of treatment* | |                                        |                  |                                  |
| Palliative        | 4.3                      | 0.03 (0.01-0.10)                       | 1*               |                                  |
| Curative          | 35.8                     | 0.39 (0.30-0.48)                       | < 0.01           | 0.29 (0.20-0.43)                 |
| Suspected diagnosis at admission | |                                        |                  |                                  |
| Cancer            | 19.5                     | 0.28 (0.21-0.37)                       | 1*               |                                  |
| Other than cancer | 9.2                      | 0.17 (0.05-0.35)                       | 1.67 (1.09-2.57) |                                  |
| Unspecific         | 5.0                      | 0.15 (0.06-0.28)                       | < 0.01           | 1.97 (1.35-2.92)                 |
| Time elapsed between admission and surgery | |                                        |                  |                                  |
| ≤ 2 days          | 20.0                     | 0.42 (0.23-0.60)                       | 1*               |                                  |
| ≥ 3 days          | 18.7                     | 0.27 (0.20-0.34)                       | 0.344            | 1.23 (0.70-2.14)                 |

*Estimated by the Kaplan–Meier method. **Adjusted for (if appropriate) age, gender, series of inclusion, tumour site and stage by Cox proportional hazards regression. **Reference category. **RR estimated by logistic regression, given the lack of proportionality of the risks over time for this variable.

resulted in the patient being admitted to the hospital through the emergency department. The type of physician seen at the first visit had more often been a general practitioner among emergency patients (89% vs 75%, P < 0.01). This group reported having seen a lower number of physicians after the first medical visit until hospital admission (P = 0.015); however, two-thirds of emergency patients repeatedly visited a physician for symptoms of the neoplasm that eventually caused the admission to hospital (Table 1). The time between the first medical symptom of cancer and the first medical visit (or ‘patient-attributable delay’) was similar.
in the emergency group (median 27 days, mean 84.2 days) and in the elective-admission group (median 30 days, mean 85.5 days) \( (P = 0.60) \), whereas the interval between the first medical visit and the diagnosis of cancer ('delay attributable to the health system') was significantly lower in the emergency group (median 51 days, mean 84.3 days) than in the elective group (70 and 123 days respectively) \( (P = 0.023) \). Overall, the symptom to diagnosis interval (SDI or 'duration of symptoms') was longer in the elective group \( (P = 0.039) \) (Table 1). Patients admitted via the emergency department were less likely to have a tentative diagnosis of cancer at admission \( (P < 0.01) \) (Table 2). In spite of a reportedly shorter SDI, they also tended to have more disseminated tumours than elective patients \( (P = 0.098) \). Among patients admitted electively, the diagnosis of certainty was achieved in a primary care centre or in the hospital outpatient clinic in over two-thirds of cases. Whereas significantly lower, this figure was nevertheless remarkable (15%) among patients admitted through the emergency department (Table 2). Surgery was the initial treatment for 73% of emergency patients and for 91% of elective patients \( (P < 0.01) \). Surgery within the first 2 days of admission was only slightly more common in emergency patients \( (P = 0.31) \). The proportions of emergency and elective

Table 4  Relative risk of death (and 95% confidence intervals) for mode of admission and selected variables (Cox's proportional hazards regression)

| Model A | Model B | Model C |
|---------|---------|---------|
| **Type of admission** | RR (95% CI) | RR (95% CI) | RR (95% CI) |
| Elective | \( 1^b \) | \( 1^b \) | \( 1^b \) |
| Emergency | 1.69 (1.18–2.42) | 1.59 (1.08–2.35) | 1.58 (1.10–2.27) |
| **Age (years)** | \( \leq 65 \) | \( \geq 76 \) | \( \geq 76 \) |
| 66–75 | 1.80 (1.17–2.78) | 2.86 (1.89–4.39) | 3.00 (1.94–4.61) | 2.59 (1.72–3.90) |
| **Type of initial treatment** | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Other than surgery | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Surgery | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| 0.38 (0.24–0.59) | 0.39 (0.26–0.61) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| **First medical symptom** | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Upper digestive | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Lower digestive | 1.83 (0.84–4.02) | 1.22 (0.56–2.68) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Constitutional syndrome | 1.38 (0.71–2.66) | 0.97 (0.49–1.91) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Abdominal pain | 1.96 (0.99–3.89) | 1.48 (0.74–2.94) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Other | 1.24 (0.59–2.62) | 0.76 (0.36–1.60) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| **First medical visit because of first symptom** | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Yes | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| No | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| 1.14 (0.76–1.70) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| **Type of physician visited (first medical visit)** | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| General | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Specialist | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| 1.36 (0.85–2.17) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| **Number of physicians visited until admission** | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| The first one only | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| One more | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Two more | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Three more | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| 1.59 (0.93–2.72) | 2.04 (1.33–3.12) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| Deviance | 1522.31 | 1491.83 | 1499.44 |
| LRS (d.f.\(^c\)) | 30.48 (6) | 22.8 (2) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |
| \( P \) | \( < 0.001 \) | \( < 0.001 \) | \( \geq 76 \) | \( \geq 76 \) | \( \geq 76 \) |

\(^a\)All estimates adjusted for gender, series of inclusion, social class, tumour site, stage and the rest of the variables shown in the table. \(^b\)Reference category. \(^c\)Likelihood Ratio Statistic (degrees of freedom), compared with model A.
patients who received treatment with a radical intention were 51% and 72% respectively (P < 0.01) (Table 2).

The overall 5-year survival probability was 0.24 (95% CI 0.19–0.31). Median survival was 12.7 months: 8 months among emergency patients and 30 months for elective patients (Table 3 and Figure 1) (P < 0.001). During the first 30 days after diagnosis, mortality was somewhat higher for emergency patients (7% vs 1% for elective patients, P = 0.061). The crude chance of death of emergency patients was 1.83 times greater than that of patients with an elective admission (CI 1.32–2.54). As shown in Table 3, a significant 61% excess risk was still present after adjustment for age, gender, cancer site and stage. The RR was significantly higher in patients with a non-cancer diagnosis at admission (Table 3). Stratification by stage at diagnosis showed that the excess risk for emergency patients was similar in each stage, and no interaction between admission and stage was apparent (P = 0.28). There was no significant change in the relationship between mode of admis-

Compared with the other modalities of initial treatment, surgery was clearly associated to longer survival (P < 0.01) (Table 3). Among patients who underwent surgery, a 69–47% excess risk was again seen for emergency patients (crude RR 1.69, CI 1.17–2.44, P = 0.005; the value of RR adjusted by age, gender, series, site and stage was 1.47, P = 0.050). Patients operated ≥3 days after admission fared slightly worse than those operated earlier (P = 0.34, bottom of Table 3). The figure persisted almost unaltered when the analysis was restricted to emergency patients (RR 1.29, CI 0.67–2.48, P = 0.45). Virtually identical results were obtained when the analysis was restricted to the first 24 h.

Mortality of emergency patients remained increased (60–70%, P < 0.05) after controlling for strong prognostic factors (such as age, tumour site and stage), as well as for other variables related to the onset of symptoms and to the process surrounding admission to hospital (Table 4). When accounting for type of treatment, admission through the emergency department continued to carry a significant excess risk (RR 1.59, P = 0.019; Table 4, model B). (Cox’s regression models could not include treatment intention because this variable did not fulfil the proportional hazards assumption.) Allowance for other variables did not substantially alter these results; for example, emergency patients still had a significant 52% excess risk of death (P = 0.041) after including in model A the time elapsed between admission and surgery. When the equivalent to model C was fitted for colorectal cancer patients only, emergency patients experienced a 77% excess risk (RR 1.77, CI 1.05–2.98); the figure was smaller for patients with stomach and oesophagus cancer (RR 1.38, CI 0.81–2.35).

**DISCUSSION**

We have analysed a disturbing phenomenon: high use of an emergency department for admission to hospital of patients with digestive tract cancer is associated to disseminated stage, treatment with a non-radical intention and decreased survival.

The number of patients in our study who were admitted through the emergency department (65%) is well within the upper range of those reported in the literature, but similar figures might be found in other settings if appropriate registries or ad hoc studies were in place. The proportion of colorectal cancer patients with an emergency presentation has been reported to vary from 11% to 50% (Holliday and Hardcastle, 1979; Nilsson et al, 1982; Fielding et al, 1989; Ratcliffe et al, 1989; Porta et al, 1991; Anderson et al, 1992; Hargarten et al, 1992; Vines et al, 1993; Curless et al, 1994; Heys et al, 1994; Mulcahy et al, 1994; Mountney et al, 1994; Scott et al, 1995). For stomach cancer, the range is 3–51% (Mikulin and Hardcastle, 1987; Haugstvedt et al, 1991; Wile et al, 1993) (70% in our sample). However, some authors cover all non-elective admissions (Holliday and Hardcastle, 1979; Nilsson et al, 1982; Brown et al, 1983; MacArthur and Smith, 1984; Mikulin and Hardcastle, 1987; Fielding et al, 1989; Ratcliffe et al, 1989; Haugstvedt et al, 1991; Porta et al, 1991; Anderson et al, 1992; Hargarten et al, 1992; Vines et al, 1993; Wile et al, 1993; Curless et al, 1994; Mountney et al, 1994; Mulcahy et al, 1994; Scott et al, 1995) (as in the present study), while others distinguish urgent from true emergencies (Heys et al, 1994; West and Rosen, 1996).

Although the present study is based on one hospital in Spain, the strong similarities in the organization and financing of primary and hospital care with other European countries suggest that the results are not irrelevant to other settings. Indeed, as demonstrated below, the integration of cancer services is a challenge throughout western Europe.

The excess risk of death observed for emergency patients agrees with studies conducted in several countries (Nilsson et al, 1982; Fielding et al, 1989; Anderson et al, 1992; Hargarten et al, 1992; Wile et al, 1993; Mountney et al, 1994; Mulcahy et al, 1994; Scott et al, 1995). Seven per cent of our emergency patients died within 30 days after diagnosis vs 1% of elective patients; these figures are similar to or below those reported by others (Fielding et al, 1989; Anderson et al, 1992; Mulcahy et al, 1994; Scott et al, 1995). In the UK study of urgent and emergency admission to hospital the 28-day mortality for patients with neoplasms was 34%, but the study probably included patients with advanced disease (West and Rosen, 1996). In the present study, the 5-year survival rates (19% for emergency patients and 34% for elective cases) are in between those observed in Manchester (Scott et al, 1995) and in Glasgow (Anderson et al, 1992), which were 29% and 16%, respectively, for emergency patients, and 39% and 33% for elective cases. The primary end point of the study was death by any cause. Whereas specific causes of death would also be of interest, there is little ground to suspect that emergency patients selectively died of causes unrelated to their cancer. For the sake of statistical precision, most analyses grouped all patients regardless of the tumour’s primary site. Nevertheless, tumour site was similarly distributed in the two groups and the variable was accounted for in the analyses.

Emergency patients had seen a lower number of physicians from symptom onset until admission but, importantly, two-thirds had made repeated visits to a doctor before being admitted. This finding indicates that the possibility of suspecting the cancer diagnosis and proceeding through an orderly referral process was often missed at the primary care level. Truly, initial symptoms were on average less specific in the emergency group, as shown by the higher frequency of the ‘constitutional syndrome’: asthenia, anorexia, weight loss and other cancer-related symptoms (such as rectal bleeding) are prevalent in primary care, and their positive predictive value for cancer is low at that level (MacArthur and Smith, 1984; Joint Council for Clinical Oncology, 1993; Curless et al, 1994; Swenson et al, 1995).

At hospital admission, tumour stage was more advanced in the emergency group (Holliday and Hardcastle, 1979; Nilsson et al, 1982; Anderson et al, 1992; Hargarten et al, 1992; Scott et al, 1995), even though the symptom to diagnosis interval (or duration
of symptoms) was shorter in this group; this apparently paradoxical observation, which has been made before (Hollday and Hardcastle, 1979; Nilsson et al, 1982; Ratcliffe et al, 1989; Porta et al, 1991; Wile et al, 1993; Maguire et al, 1994; Mountney et al, 1994; Scott et al, 1995; Porta et al, 1996b), may essentially have two complementary explanations: firstly, the biological aggressiveness of tumours could on average be higher among patients that resort to the emergency department (Feinstein, 1966; Gómez et al, 1996; Piccirillo and Feinstein, 1996) and, secondly, these patients may underestimate the duration of their symptoms (e.g. a lower rate of physician contact may be associated with a lower awareness of symptoms). The finding that the duration of symptoms has little prognostic influence in cancers of the digestive tract has also been published previously (Hollday and Hardcastle, 1979; Nilsson et al, 1982; Brown et al, 1983; Ratcliffe et al, 1989; Haugstedt et al, 1991; Porta et al, 1991; Wile et al, 1993; Maguire et al, 1994).

As in other settings (Haugstedt et al, 1991; Anderson et al, 1992; Hargarten et al, 1992; Wile et al, 1993; Mountney et al, 1994; Mulcahy et al, 1994), treatment with a curative or radical intention was more common in electively admitted patients, and this was a strong determinant of prognosis. Nonetheless, even among subjects who underwent surgery, emergency patients had a 50–70% excess risk. It could be hypothesized that emergency patients were treated less often by senior surgeons (Gulliford et al, 1991; Anderson et al, 1992); yet, surgery within the first 2 days of admission was only slightly more common in emergency patients, and it did not carry an increased risk. Besides, a statistically significant excess risk of almost 60% persisted after adjusting for stage and type of initial treatment (models B and C, Table 4). Thus, the survival difference is unlikely to be explained by emergency patients having received suboptimal surgery in the emergency situation.

Overall, the excess risk observed among emergency patients was consistent enough to warrant further and serious consideration. This need is also supported by the limited scope of the literature in this area. Although from a clinical perspective it is known that patients with digestive tract cancer presenting electively have a higher chance of survival than those who present as true emergencies, comprehensive analyses are lacking. For example, the average proportion of cancers among all referrals is not available (Mountney et al, 1994), and population-based studies on health care utilization have not integrated data spanning from symptom onset to diagnosis and outcome. Specifically, an in-depth assessment of possible reasons and mechanisms for the difference in survival would require information in two areas: firstly, on the pre-hospital help-seeking and medical care process (e.g. health care choices made and management received by oncology patients, referral patterns) and, secondly, on the precise reasons for presentation to and admission through the emergency department (e.g. type of referral, presenting complaint, case severity). But even if comorbidity and severity of the disease at presentation could partly explain the outcome differential, the clinically and policy-relevant fact would remain that the emergency patients’ condition when they gain access to the hospital is too severe and thwarts survival.

Information on the in-hospital diagnostic and treatment process (timing of key clinical actions, indication for surgery, type of surgical procedure, subsequent therapeutic decisions, clinical course) could also be of interest. Nonetheless, we believe that the intrinsic quality of in-hospital care provided to emergency patients with cancer is essentially identical to that given to elective patients.

The above considerations outline the limitations of the present study. However, by contrast to clinically oriented studies, we were able to assess the role of a wide variety of factors through three types of data sources: personal interviews with patients provided data on the health care process followed from symptom onset to diagnosis; hospital clinical records furnished information on factors such as the diagnoses suspected at admission, stage and type of treatment; and the hospital tumour registry was instrumental in achieving a high rate of follow-up. Cancer registries have a role in assessing the need for services and clinical outcomes (Mountney et al, 1994; Calman, 1995; Malats et al, 1995; Selby et al, 1996). In fact, the analyses reported here were partly prompted by data from our hospital registry of a high rate of admission via the emergency department (Casamitjana et al, 1996; Porta et al, 1997).

The use of emergency departments for non-urgent care contributes to overcrowding and may hamper the quality of care that severely ill patients receive (Artal et al, 1991; Steinbrook, 1996). Yet, the policy implications of costs of non-urgent care in emergency departments are debated. Non-urgent visits to emergency departments partly reflect a failure to provide accessible primary care, particularly to minorities and to those of lower socioeconomic status (Hargarten, 1992; Tyrance et al, 1996). They also reflect severe problems in the integration between primary and secondary care. It could be argued that emergency departments constitute a useful resource for lessening diagnostic and therapeutic delays in cancer. However, the present study suggests that emergency departments are unable to counterbalance the deficiencies in the other levels of the health system.

What role can the primary care team realistically fulfil within the network of cancer services, particularly with respect to early detection, referral and follow-up? The Report by the Expert Advisory Group on Cancer to the Chief Medical Officers of England and Wales (Calman, 1995) advocates the integration of primary care with cancer units and centres. Whereas the report asserts that ‘arrangements should be in place for rapid referral of patients to, or liaison with, a cancer unit or centre’, it also acknowledges the need ‘to allow flexibility for emergency presentations of cancers in hospitals without cancer units’. On a similar tone, an assessment review of health care needs for colorectal cancer concluded that ‘targets could be set to reduce the current level of emergency admissions by up to 20%’ (Mountney et al, 1994). Research and discussion on these and related issues is of paramount importance at a time when significant changes are underway in the organization of cancer services and of general practice – in Spain, in the UK and throughout Europe. Unless substantial progress is achieved, emergency admission for cancer shall remain a matter of survival.

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