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Diagnostic delay, clinical stage, and social class: a hospital based study

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Abstract

***Study objective*—To measure delay in admission to a large hospital and to study the role of social class and other potential determinants of delay.**

***Design*—Interview of a 10% sample of newly diagnosed patients admitted to medical or surgical wards, and all those admitted for external hernia or colon cancer between June 1989 and May 1990.**

***Setting*—The largest hospital in an Italian region of five million inhabitants.**

***Subjects*—The study population consisted of 330 patients with a range of different medical and surgical conditions, 83 patients with external hernias, and 97 patients with colon cancers.**

***Measurements and main results*—After patient interview and discharge from hospital, the clinical record was consulted for information on the length of stay and the diagnosis, and in particular for the staging of hernia or colon cancer (according to the protocol of the Jefferson Medical College). Multiple logistic regression was used to estimate odds ratios and 95% confidence intervals. There was an association between advanced disease at hospital admission and the patient's educational level. In each of the three groups of patients, those with the highest educational level had a 30% or lower probability of being admitted to hospital with advanced disease compared with those with the lowest education level (after allowance for sex, age, area of residence, and marital status).**

***Conclusion*—Lower social class was associated with a more advanced clinical stage of hernia or colon cancer, and with a higher probability of urgent admission to the hospital for a newly diagnosed disease. Delay in seeking care, did not however, seem to explain the social class differentials for disease stage.**

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Diagnostic delay has been associated with indicators of social class and ethnicity in several studies, particularly on cancer.[1-12] The epidemiology of delay in providing care is becoming an important subject of research.[13] In a recent, large study in Massachussets, the patients with the lowest educational achievement or the lowest income had an increased relative risk of delay in securing hospital care for a number of medical or surgical conditions.[14]

We have conducted a study in our hospital, which is the largest in a region of five million inhabitants. The study aimed to measure the time intervals between the onset of symptoms, examination by the general practitioner (GP), and admission to hospital, and to identify the determinants of delay. We studied both a 10% sample of the patients in the medical or surgical wards, and all the patients with two common surgical conditions—external hernia and colon cancer. Hernia and colon cancer were staged according to the protocol of the Jefferson Medical College.[15]

Methods

A sample was drawn from all the patients admitted to the medical or surgical wards of the Main Hospital in Turin, between June 1989 and May 1990. Patients were identified from the computerised registry files. A 10% sample was drawn daily using a systematic procedure. Overall, 23 departments (including university clinics) were involved in the study. The sample did not include patients with traumatic conditions (who are admitted to a specialised hospital). The most common diagnostic groups were benign diseases of the intestine (15%), non-coronary heart disease (8%), coronary heart diseases (8%), diseases of the endocrine system (8%), and cancers at several sites (14%).

We subsequently identified and recruited all the patients admitted with a first time diagnosis of external hernia or colon cancer to any department of the hospital between September 1990 and May 1991. We chose these because they are common surgical conditions in which diagnostic delay might influence prognosis.

There were no restrictions in relation to sex, age, or residence. The patients were interviewed by a trained nurse three days after hospital admission. The interview, which lasted between 30 and 40 minutes, collected information about the events preceding admission to hospital and sociodemographic variables. The third day was chosen to avoid interviewing patients whose inpatient stay was extremely short because of very severe or very mild diseases.

After the interview and discharge from hospital, the patient's clinical record was traced and information was collected on the length of stay in the hospital and the diagnosis. Those patients with external hernias and colon cancer were grouped according to the disease staging protocol proposed by the Jefferson Medical College to study diagnostic delay. The protocol provides, for each of several diseases, about 14–16 categories which are considered to be predictive of clinical outcomes.[15]

We computed the time intervals between the main events in the course of the disease: onset of

symptoms, first examination by the GP, request for admission to hospital, and hospital admission. We have estimated odds ratios and the corresponding 95% confidence intervals using multiple logistic regression to adjust for the role of confounding variables.[16] All the computations have been made using SAS software for a personal computer.

Colon cancer and hernia were staged according to the Jefferson Medical College. Because of small numbers, stages were grouped (colon cancers: 0=stages 1 and 2; 1=stages 3·1 and greater; hernias: 0=1·0 and 1·2; 1=greater than 1·2). In this sample, first admission through the emergency department was considered to be an indicator of advanced stage disease.

Results

The 10% sample group comprised 694 patients, 502 of whom were interviewed. The remaining 192 had been discharged before the third day and were not therefore eligible. Only 330 subjects with a newly diagnosed condition were included in the analyses (181 men and 149 women). A total of 102 patients had external hernia but the disease staging protocol was applicable to only 83 (72 men and 11 women). Altogether 131 patients had colon cancer, and the staging protocol could be applied to 97 (56 men and 41 women).

Univariate analysis showed a strong association between disease severity (as defined in the methods section) and age for the sample. The proportions of patients with advanced stage colonic cancer were 49% at age <50 years; 55% at age 50–59; 74% at age 60–69; and 81% at age ≥70): for patients with hernia the proportions were 15%; 17%; 18%, and 50% respectively. In addition, a clear trend with education was evident for each of the three disease groups. The proportions of advanced stage disease in relation to the number of school years were: 78% for <5 school years, 67% for 5–7, 58% for 8–12, and 58% for 13+ in the 10% sample; 79%, 77%, 68%, and 57%, respectively, in patients with colon cancer and 43%, 22%, 21%, and 14% respectively for hernia patients.

Table I shows the results of logistic regression analysis, including education levels and potential confounding variables as independent variables. In each of the three patient groups, the probability of admission with more advanced disease is clearly lower for subjects with a higher educational level.

We have studied the time intervals between (1) the onset of symptoms and first examination by the GP; (2) the first examination and the request for hospital admission; and (3) the request and hospital admission. No clear association between disease stage and the length of any of these intervals was found. Table II gives data on the first interval (between symptoms and first medical examination): although some of the odds ratios are lower than unity, indicating a higher probability of delay in seeking care for the less educated, all confidence intervals include 1·0. Delay in seeking care does not therefore seem to explain the large differences between educational levels observed for disease stage.

Table I Educational level and disease severity at first hospital admission. Odds ratios (OR) have been computed with a logistic regression model including sex, age, marital status, area of residence, and educational level, and express the relative risk of admission with advanced stage disease (urgent v non-urgent for the 10% patient sample; stage 1 v stage 0 disease for colon cancer and hernia patients).

	Educational level (years of school)			
Patient group	*<5*	*5–7*	*8–12*	*13+*
10% sample:				
No	64	120	79	67
OR	1·0	0·45	0·33	0·34
95% CI	–	(0·19, 1·1)	(0·13, 0·89)	(0·12, 0·94)
Colon cancer:				
No	19	43	19	14
OR	1·0	0·97	0·47	0·20
95% CI	–	(0·2, 4·6)	(0·07, 2·9)	(0·03, 1·3)
Hernia:				
No	7	27	14	35
OR	1·0	0·41	0·75	0·32
95% CI	–	(0·6, 2·9)	(0·08, 6·7)	(0·46, 2·2)

Table II Distribution of patients in relation to the time interval between the onset of symptoms and the first medical examination, educational level, and type of admission (urgent via emergency department or not urgent directly to the hospital ward).

	Admission					
	Urgent			*Not urgent*		
	Interval (days)			*Interval (days)*		
Years of school group	*<1*	*1–7*	*8+*	*<1*	*1–7*	*8+*
10% sample:						
<8y	75	35	17	29	6	13
8+y	39	31	14	40	6	12
OR	1·0	1·7	1·6	1·0	0·7	0·7
95%	–	0·9, 3·2	0·7, 3·5	–	0·2, 2·5	0·3, 1·7
Colon cancer:						
<8y	3	5	10	22	7	14
8+y	2	4	3	10	6	8
OR	1·0	1·2	0·4	1·0	1·9	1·3
95% CI	–	0·1, 12	0·05, 4·2	–	0·5, 7·1	0·4, 4·0
Hernia:						
<8y	5	0	2	11	5	11
8+y	2	0	0	26	8	13
OR	1·0	–	–	1·0	0·7	0·5
95% CI	–	–	–	–	0·2, 2·5	0·2, 1·4

Discussion

We interviewed some 500 patients overall about their experience preceding admission to a large hospital in Italy. For each of three different groups of patients with a newly diagnosed disease (a 10% sample of patients admitted to medical or surgical wards, patients with external hernias, and those with colon cancers) we found a clear association between education level and the stage of disease at hospital admission. The probability of being admitted with advanced stage disease was one third or less for highly educated compared with less well educated patients. The time interval between the onset of symptoms and the first medical examination by the GP was not clearly associated with social class, nor was the interval preceding hospital admission. Delay in seeking care does not seem to be an obvious explanation for the social class differentials in disease stage at admission.

The latter observation contrasts with a large investigation in five hospitals in Massachussets, in which patients with lower education or lower income had odds ratios of between 1·6 and 2·5 for delayed access to the hospital for a wide range of conditions.[14]

We cannot, however, rule out the possibility that inaccuracy in reporting the dates of onset of symptoms and examination by the GP was unevenly distributed in different social groups, possibly introducing random misclassification. The information on which the disease stage was

assessed came from clinical records and not from interviews, and therefore was less subject to misclassification.

A more advanced disease stage at first diagnosis is undesirable. Why social class should influence the disease stage at hospital admission, however, requires further elucidation. Our observation might help explain why some studies have found wide differences in survival between socioeconomic groups. In particular, recent analysis of a 1% sample of the English population reported shorter survival from several cancers in lower socioeconomic groups. The standardized case fatality ratio in men with colon cancer was 128 (95% CI 105, 154) among council tenants (that is those in the lower socioeconomic group), and 89 (77, 102) for owner-occupiers.[17] The authors of the study tended to attribute these differences to delay in seeking care, but there is no conclusive evidence that delay in seeking care is associated with survival.[18] The entire subject of social class, diagnostic delay, stage at hospital admission, delay in treatment, and prognosis warrants further clarification from analytical epidemiological studies.

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