Non-acute abdominal complaints in general practice: diagnostic value of signs and symptoms

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SUMMARY

Background. *Although many patients are evaluated initially by their general practitioner, clinicians' accuracy at diagnosing organic gastrointestinal disease has not been studied in a primary care setting. Different spectra of severity of diseases in general practice and hospital populations may lead to different values for diagnostic tests in these two populations.*

Aim. *This study set out to determine the diagnostic value of history and physical and laboratory items for organic and neoplastic disease in general practice patients with non-acute abdominal complaints.*

Method. *The one-year prospective, observational study was carried out in 1989 in 80 general practices in Limburg, the Netherlands. The study subjects were 933 patients (aged 18–75 years) presenting to their general practitioner with new non-acute abdominal complaints of minimum duration two weeks, and with whom the doctor had a diagnostic problem. Patients were physically examined by their general practitioner and asked to complete pre-structured questionnaires. Basic laboratory tests were carried out. Patients were followed up for at least one year by researchers and then a diagnosis was determined by an independent panel of three general practitioners using patient records, blinded for the results of the questionnaires. Sensitivity, specificity and odds ratios were calculated for clinical items. Stepwise forward logistic regression analysis was undertaken to identify independent predictors of organic gastrointestinal disease.*

Results. *Of the 933 patients 14% had organic gastrointestinal disease. No clinical item had both high sensitivity and specificity. Logistic regression analysis showed only eight independent predictors of organic disease: male sex, greater age, epigastric pain, no specific character to pain, pain affecting sleep, history of blood in stool, no pain relief after defecation and abnormal white blood cell count. When the model was programmed to predict neoplasms five items were found: male sex, greater age, no specific character to pain, weight loss and erythrocyte sedimentation rate greater than 20 mm hour^{-1}.*

Conclusion. *In a general practice population with non-acute abdominal complaints some clinical findings can be used as predictors for organic and neoplastic gastrointestinal disease.*

Keywords: gastrointestinal diseases; symptoms [disease]; differential diagnosis; diagnostic skills.

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Introduction

THE diagnosis of non-organic disease of the digestive tract in patients with non-acute abdominal complaints is dependent on clinical criteria.[1] Certain gastroenterological features are assumed to occur more commonly in patients with functional diseases like irritable bowel syndrome or non-ulcer dyspepsia than in patients with organic disorders. Recent studies have reviewed the diagnostic value of these symptoms, particularly in separating non-organic disorders from organic conditions.[2,3] Although many patients are evaluated initially by their general practitioner, clinicians' accuracy at diagnosing organic gastrointestinal disease has not been studied in a primary care setting. Different spectra of severity of diseases in general practice and hospital populations may lead to different values for diagnostic tests in these two populations.[4]

The purpose of this study was to determine the most useful clinical predictors for organic and neoplastic gastrointestinal disease in a primary care setting.

Method

Patients

A one-year prospective study was undertaken in 1989. Of 460 general practitioners in Limburg, the Netherlands, 80 agreed to participate. A total of 933 patients aged 18–75 years, consulting these 80 general practitioners for new abdominal complaints lasting at least two weeks and giving their consent to participate, were entered into the study. The general practitioners were asked to include only those patients with whom they had a diagnostic problem.

Clinical examination

All patients entered into the study were asked to complete a pre-structured questionnaire. This included signs and symptoms that were reported in the literature to discriminate between organic and non-organic abdominal complaints.[2,3] Patients were also asked to complete four psychological questionnaires: the Zung questionnaire for depression,[5] the self esteem and social inadequacy subscales of the Dutch personality inventory[6] and a questionnaire about perceived health, a short version of a general health questionnaire.[7]

The results of physical examinations were recorded by the general practitioner in a standardized way. All patients underwent the following laboratory tests: haemoglobin level, white blood cell count, erythrocyte sedimentation rate and faecal occult blood test (three times, with peroxidase-free diet). Other tests were performed when the general practitioner felt they were clinically indicated.

Diagnoses

Patients were only investigated invasively (for example, by

endoscopy) when the general practitioner decided this was clinically indicated. All patients were followed up by the researchers for at least one year (mean 18 months). All intercurrent events during the follow-up period were recorded by the researchers by asking the general practitioners and by studying the practice medical records. The final diagnoses, made after the follow up, were classified according to the *International classification of primary care* (ICPC)[8] by a panel of three general practitioner authors (J M, R S and G F) using patient records, blinded to the results of the questionnaires. When no agreement was reached within the panel a group of professors in the department of internal medicine and general practice at the University of Limburg was consulted. The diagnoses were grouped into two categories for comparison: organic and non-organic gastrointestinal disorders. In a second analysis neoplasms were compared with all other diagnoses.

Data analysis

Signs and symptoms and laboratory and psychological test results were initially analysed using univariable techniques. Sensitivity, specificity and odds ratios were calculated. The sensitivity of a symptom is the probability (0–100%) that a symptom is present in patients with organic (or neoplastic) disease. The specificity is the probability (0–100%) that a symptom is absent in patients who have no organic (or neoplastic) disease. The odds ratio is calculated from sensitivity and specificity using the following formula:

$$\text{Odds ratio} = \frac{\text{sensitivity} \times \text{specificity}}{(100 - \text{sensitivity}) \times (100 - \text{specificity})}$$

The diagnostic value of a test is better when its odds ratio has values near zero or greater than one.[9] Items having an association with organic or neoplastic disease where $P<0.25$ were entered into a multiple stepwise forward logistic regression analysis to identify independent predictors of organic gastrointestinal disease, taking the included variables into consideration simultaneously.[10] The analyses were performed using *BMDP*.

Results

Of the 933 participating patients, 598 (64.1%) were women. Overall, 517 patients (55.4%) were aged 40 years or above. The women patients were somewhat younger than the men patients (52.7% were aged 40 years or above compared with 60.3% of the men). A total of 135 patients (14.5%) were diagnosed by the general practitioner panel as having organic disease. The prevalence of organic disease increased with age — 9.9% in the 18–29 years age group (22/222), 11.9% in the 30–39 years group (23/194), 15.8% for 40–49 year olds (28/177), 15.9% for 50–59 year olds (27/170) and 20.6% for those aged 60 years and over (35/170).

The distribution of the final diagnoses is presented in Table 1. The prevalence of neoplasms was 2.6% (24/933). The sensitivities, specificities and odds ratios for the signs and symptoms and laboratory and psychological test results found in earlier studies,[11-14] are shown in Table 2. No single item had both high sensitivity and specificity. Apart from sex and age, only four clinical symptoms had significant odds ratios: no specific character to pain; no pain relief after defecation; pain affecting sleep; and history of blood in stool. Among the laboratory tests, high erythrocyte sedimentation rate, high white blood cell count and low haemoglobin level were associated with organic disease. The psychological tests did not show significant differences between the groups with organic and non-organic diagnoses.

Multiple logistic regression analysis found eight independent predictors of organic disease: male sex, greater age, epigastric pain, no specific character to pain, pain affecting sleep, history of blood in stool, no pain relief after defecation and abnormal white blood cell count (Table 3). Table 3 also shows results of the logistic regression analysis for the prediction of neoplasms. The model consisted of five items: male sex, greater age, no specific character to pain, weight loss and erythrocyte sedimentation rate greater than 20 mm hour^{-1}.

Table 1. Final diagnoses in the 933 patients.

ICPC-code/final diagnosis	% of patients
Non-organic	
D01–D29 abdominal symptoms (no diagnosis)	*63.1*
D87 disorders of stomach function/gastritis	*7.6*
D93 irritable bowel syndrome	*14.8*
Organic	
D70 infectious diarrhoea, dysentery	*0.4*
D73 other presumed infections	*1.1*
D74 malignant neoplasm stomach	*0.2*
D75 malignant neoplasm colon, rectum	*0.4*
D76 malignant neoplasm pancreas	*0.2*
D77 malignant neoplasm other and unspecified sites	*0.2*
D78 benign neoplasms (digestive tract)	*0.9*
D84 disease of oesophagus	*0.4*
D85 duodenal ulcer	*1.7*
D86 other peptic ulcers	*1.0*
D88 appendicitis	*0.1*
D89 inguinal hernia	*0.1*
D90 hiatus (diaphragm) hernia	*0.3*
D91 other abdominal hernia	*0.1*
D92 diverticular disease intestines	*1.4*
D94 chronic enteritis/ulcerative colitis	*1.3*
D95 anal fissure/perianal abscess	*0.4*
D98 cholecystitis/cholelithiasis	*0.3*
D99 other disease digestive system	*0.1*
K96 haemorrhoids	*0.6*
R84 malignant neoplasm trachea/bronchus/lung	*0.2*
U70 pyelonephritis/pyelitis, acute	*0.1*
U71 cystitis/other urinary infection	*0.2*
U75 malignant neoplasm kidney	*0.1*
U95 urinary calculus	*0.4*
U99 other disease urinary system	*0.2*
X75 malignant neoplasm cervix	*0.1*
X77 other malignant neoplasm (female genital system)	*0.2*
X78 fibroid/myoma (uterus/cervix)	*0.9*
X99 other diseases female genital tract	*0.6*

Discussion

The univariate analysis showed that male sex, greater age, four clinical symptoms and some laboratory tests are associated with organic disease in patients with non-acute abdominal complaints. No such evidence could be found for psychological variables. The variables used in this study were based upon studies by others.[11-14] The direction of the association between the variables and the outcome are in line with earlier studies and clinical experience. For example, Smith and colleagues also reported that clinical symptoms like specific character of pain and pain relief after defecation, and female sex were associated with irritable bowel syndrome.[15]

What may be seen as useful by clinicians is the fact that in the regression analysis a number of the items associated with neoplasm correspond with what can be called 'signs of alarm': weight loss, greater age and an abnormal erythrocyte sedimentation rate.

Table 2. Diagnostic value of signs and symptoms and laboratory and psychological test results for organic gastrointestinal disease in 933 patients (rounded percentages).[a]

Characteristic	% of patients with organic disease	Sensitivity (%)	Specificity (%)	Odds ratio[b]
Male sex (n = 335)	20	48	66	1.80**
Age >30 years (n = 712)	17	84	25	1.80*
Age >60 years (n = 171)	21	25	83	1.61*
Symptoms				
History of blood in stool (n = 160)	22	25	84	1.78**
Pain affecting sleep (n = 413)	19	55	58	1.66**
No pain relief after defecation (n = 574)	17	71	40	1.61*
No specific character to pain (n = 114)[c]	21	17	89	1.61*
No alternating constipation and diarrhoea (n = 559)	17	69	42	1.56
Weight loss >1 kg in 4 weeks (n = 264)	19	35	73	1.45
Symptoms less than 2 years (n = 802)	16	89	15	1.43
No more frequent stools at pain onset (n = 613)	16	71	35	1.37
Feeling of abdominal distension (n = 135)	19	18	86	1.35
No pyrosis (n = 551)	17	65	42	1.35
Epigastric pain (n = 592)	16	69	38	1.31
Gas bloat/belching (n = 601)	16	69	36	1.29
No abdominal pain/flatulence/irregularities of bowel movements (n = 193)	17	24	80	1.22
Vomiting since pain began (n = 139)	17	17	85	1.22
No looser stools at pain onset (n = 416)	16	49	56	1.21
Significant past history (n = 6)[d]	17	1	99	1.13
Poorly localized pain (n = 358)	16	41	62	1.12
No mucus per rectum (n = 746)	15	81	20	1.11
Rarely feel evacuation incomplete (n = 746)	15	81	20	1.11
Borborygmi (n = 182)	16	21	81	1.09
No visible abdominal distension (n = 266)	16	30	72	1.09
Pain is constant or unrelieved by food/medication (n = 453)	16	50	52	1.07
Post-prandial abdominal pain (n = 246)	15	26	74	1.00
Laboratory tests				
White blood cell count >10 000 mm^{-3} (n = 80)	28	16	93	2.36**
Erythrocyte sedimentation rate >20 mm $hour^{-1}$ (n = 75)	25	14	93	2.07**
Low haemoglobin level (n = 150)	23	25	86	1.97**
Positive faecal occult blood test (n = 79)	18	10	92	1.24
Psychological tests				
Low somatization score (perceived health questionnaire) (n = 159)	17	23	81	1.25
No depression (Zung) (n = 542)	16	75	30	1.25
High self esteem (n = 212)	17	25	78	1.16
Social inadequacy (n = 314)	16	36	67	1.15

n = number of patients in group. [a]Missing values for some of the variables. [b]Calculated from raw data. [c]No description of the pain as one or more of the following: burning, cutting, terrible, feeling of pressure, dull, boring. [d]Cancer, diverticular disease, gallstones, inflammatory bowel disease. *P<0.05; **P<0.01.

Using the model from this study (data on Table 3), probabilities for neoplastic disease (P) can be calculated for different clinical situations, using the following formula:

$$\ln [P/(1-P)] = \text{sum of the coefficients of the constant and the clinical items present in a certain patient}$$

A wide range of probabilities for neoplastic disease can be calculated. For example, age 65 years plus male sex, probability 3%; age 65 years plus male sex plus non-specific abdominal pain, 18%; age 65 years plus male sex plus non-specific abdominal pain plus weight loss, 50%; and age 65 years plus male sex plus non-specific abdominal pain plus weight loss plus erythrocyte sedimentation rate greater than 20 mm $hour^{-1}$, 75%.

The patients in this study had a broad spectrum of abdominal symptoms and were recruited from general practice. In this study, only patients for whom diagnosis was a problem were selected. The selection criteria avoided the verification bias found in studies in which the diagnostic standard is restricted to patients with a high probability of disease.[16] In addition, expectation bias was avoided by having the clinical results assessed by a panel of practitioners rather than the practitioners who had been consulted, and by using explicit criteria for diagnosis.[8] A potential limitation of this study is the criterion standard. It is possible that some relevant organic diagnoses were not made during the follow-up period of at least one year. Relevant diagnoses discovered after the follow-up period would change the distribution of patients with organic and non-organic disease. It was decided not to examine all patients invasively for reasons of inconvenience for the patient and cost. Furthermore, even when a patient has had a full examination, including colonoscopy and so on, the diagnosis can still be missed. It could be that false positive or clinically irrelevant findings might result from intensive screening at the time of presentation. Overall, it would appear appropriate to predict the probable diagnosis which manifests itself within one year of presentation of an abdominal com-

Table 3. Results of stepwise logistic regression analysis: significant variables for the prediction of organic disease and for the prediction of neoplasms in patients with non-acute abdominal complaints.

Variable	Regression coefficient (SE)	Odds ratio (95% CI)
Organic disease		
No specific character to pain	1.16 (0.33)	3.20 (1.69 to 6.05)
White blood cell count > 10 000 mm^{-3}	0.93 (0.29)	2.54 (1.45 to 4.45)
Pain affecting sleep	0.78 (0.22)	2.18 (1.43 to 3.33)
History of blood in stool	0.58 (0.23)	1.79 (1.14 to 2.81)
Male sex	0.55 (0.20)	1.73 (1.18 to 2.54)
Epigastric pain	0.54 (0.24)	1.72 (1.08 to 2.73)
No pain relief after defecation	0.50 (0.22)	1.65 (1.08 to 2.54)
Greater age (years)[a]	0.02 (0.01)	1.02 (1.01 to 1.03)
Constant	–6.36 (0.43)	
Neoplasms		
No specific character to pain	1.74 (0.54)	5.70 (1.97 to 16.51)
Weight loss	1.47 (0.47)	4.36 (1.72 to 11.11)
Erythrocyte sedimentation rate >20 mm $hour^{-1}$	1.10 (0.51)	3.00 (1.10 to 8.17)
Male sex	1.07 (0.45)	2.37 (1.20 to 6.99)
Greater age (years)[a]	0.07 (0.02)	1.08 (1.04 to 1.11)
Constant	–9.02 (1.19)	

SE = standard error. CI = confidence interval. [a]Continuous variable.

plaint with selective use of investigations. The panel made the decision that the diagnoses described here were associated with the abdominal complaints presenting to the general practitioner. However, it cannot be determined whether diagnoses such as myoma uteri or cervical neoplasm are the actual cause of the presented abdominal pain. For these reasons some misclassification may be present in this study, despite the intensive clinical follow-up period.

In conclusion, these data support eight independent predictors of organic gastrointestinal disease and five of neoplastic disease. Some 'alarm' signals have been recognized, namely weight loss, greater age and an abnormal erythrocyte sedimentation rate. Further validation of these findings in another population of general practice patients with non-acute abdominal complaints is recommended. In such a study a systematic follow up of the clinical outcome and the course of the complaints should also be performed.

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