

Computers in Medicine

Diagnosis of Dyspepsia from Data Collected by a Physician's Assistant

JANE C. HORROCKS, F. T. DE DOMBAL

British Medical Journal, 1975, 3, 421-423

Summary

This paper presents a study of the diagnosis of "dyspepsia" in 154 patients based on data collected at their initial outpatient attendance via an interview with a non-medically qualified physician's assistant. The reactions of patients to this type of interview were favourable, and the data recorded were as reliable as those recorded by clinicians. We conclude (1) that the data recorded by the physician's assistant are valuable diagnostically; (2) where these cannot be collected by a qualified physician, this task may be delegated to a non-medically qualified person; but (3) this interview should augment and not replace the traditional clinical interview.

Introduction

There is some evidence that up to half of all patients with dyspepsia emerge from their first contact with a clinical team without any firm diagnosis having been established.¹⁻³ This is undesirable, in itself and because it leads to certain undesirable events—such as patients with gastric cancer being referred for cholecystogram or, worse still, "observed" over a period of months until their cancer has "declared itself". We ourselves have shown that a simple computer-aided system, supplied with data from the house surgeon's case records, could discriminate between common "organic" causes of dyspepsia—such as peptic ulcer, cholecystitis, or gastric cancer—in 86% of a series of patients admitted for surgery.³ However, some criticisms can be levelled at such a comparison. For example, the data may change between initial outpatient contact and admission to hospital in such a way as to clarify the clinical picture.

We therefore carried out an additional investigation in which we noted for 154 patients with "dyspepsia" the diagnostic accuracy of a computer-aided system supplied with data elicited at initial outpatient attendance. To study further the role of data gathering in this situation the computer was supplied not with the clinician's own data but with data elicited via an interview carried out by a non-medically qualified physician's assistant.

University Department of Surgery, General Infirmary, Leeds LS1 3EX

JANE C. HORROCKS, Computer Programmer and Physician's Assistant
F. T. DE DOMBAL, M.D., F.R.C.S., Reader in Clinical Information Science

Methods

PATIENTS STUDIED

The 154 patients studied in this investigation formed a prospective unselected group presenting between November 1972 and November 1973 to three surgical outpatient clinics in the General Infirmary at Leeds. All were referred suffering from "dyspepsia," which we have previously defined³ as upper abdominal or retrosternal pain accompanied by symptoms referable to the upper gastrointestinal tract (such as nausea and vomiting). The composition of the series according to their (eventually established) diagnosis is shown in table I. For the purposes of this study diagnoses made during the initial contacts and interviews with the patient were compared with this "final" diagnosis established after investigation and—frequently—surgical intervention.

TABLE I—Final* Diagnosis in the Current Series of 154 Patients

Diagnosis	Cases	
	No.	%
"Functional"	61	39.6
Duodenal ulcer	57	37.0
Cholecystitis	22	14.2
Gastric ulcer	8	5.2
Gastric carcinoma	6	3.9
Total	154	99.9

*After initial investigation and management. Whether "functional" diagnosis can be regarded as "final" is an open question (see text). Most other diagnoses were made at operation.

CONDUCT OF INVESTIGATION

On appearing at the outpatient department and before the customary clinical consultation each patient was asked for consent to an extra interview conducted by one of us (J.C.H.), a non-medically qualified physician's assistant. Before the interview it was explained to each patient that this interview was additional to the customary procedure, and that their normal consultation would follow in due course. Each interview took between five and ten minutes and was conducted in the presence of a qualified physician (who took no part in the proceedings).

One major reason for the selection of "dyspepsia" as a clinical problem for study lies in the importance of the history of its diagnosis. The encounter between physician's assistant and patient was therefore strictly limited to history taking, no patient being examined by the assistant. Table II lists the items of information sought at each interview and shows the type of detailed history which resulted.

The data thus recorded were analysed with a computer-aided system based around a WANG 700C desk-top computer-calculator. This is described in some detail elsewhere.^{3,4} A sample of printout from the system is shown in fig. 1.

METHOD OF ASSESSMENT

As Vickery remarks,⁵ the use of paramedical personnel to perform

health care tasks inevitably raises the question of quality. Does the paramedical person provide as good care as the physician in undertaking such tasks? Thus we studied (1) the time taken by each interview and the patient's reactions to it; (2) observer variation, in the sense of inquiring whether the assistant acquired identical information to a physician; and (3) the value of the information acquired, by comparing several analyses of the assistant's data with similar analyses of physician's data from identical patients.

TABLE II—Items of Information Sought from each Patient by Physician's Assistant

Age.	Site at onset.	Periodicity.	Severity.	Radiation.	Aggravating factors.	Relieving factors.	Relationship to meals.	Progress.	Night pains.
Sex.	Site at present.								
Pain.									
Nausea.	Bowel habit.								
Vomiting.	Micturition.								
Haematemesis.	Weight.								
Appetite.	Previous surgery.								
Dysphagia.	Drugs.								
Previous indigestion.	Family history.								
Jaundice.	Smoking habits.								
	Drinking habits.								

Case ref-AB

Male
Age 50-59
Site onset: Epigastric
Site present: Upper half
No radiation
Duration 6-12 mths
Continuing attacks
Mod pain
Progress-worse
Aggravated by nil
Pain not related to meals
Relieved by vomiting
No night pains

Nausea
Vomiting
No haematemesis
Anorexia
No dysphagia
Prev. indigestion
No jaundice
Bowels - pale stools
Micturition - normal
Weight decreased
No previous abd. operations
Taking drugs

Family history negative
Smokes - 10 per day

Functional	Chole	D.Ulcer	G.Ulcer	G.Ca
.02	4.60	.04	2.49	92.82

FIG. 1—Sample of computer printout showing display of data elicited by interview with physician's assistant.

Findings

DETAILS OF INTERVIEW

After due explanation of the procedure no patient refused to be interviewed. All interviews were completed, none being abandoned because of difficulties encountered. Indeed, in only three or four interviews was any particular difficulty experienced. This was due primarily to language problems in patients recently arrived in Britain. The mean interview time was just over 5 minutes, no interview taking longer than 15 minutes to complete.

PATIENT REACTION

We held post-interview discussions with the first 30 patients seen. No patient objected to the interview having been carried out. All felt that the questions had been either thorough or very thorough, and the explanations given either clear or very clear. All would be willing to undergo such an interview again. The overwhelming majority felt that a detailed interview of this nature with a "non-threatening"

person was—in retrospect—valuable to them in overcoming their own initial nervousness and clarifying their own ideas.

Many patients expressed approval of the fact that, before seeing the assistant, they were told that a medical consultation would follow. But when asked if—in other circumstances—they would be prepared to consult an assistant *instead* of a doctor the majority of answers were negative.

OBSERVER VARIATION

Studies of observer variation were carried out on a series of 25 patients. The patients did not form part of the main series, for in these studies each patient was interviewed twice, once by the assistant and once by the physician, who on this occasion was asked to collect all of the items of information listed in table II. The results of the interviews, subsequently compared, show that the data elicited by a paramedical person are not identical to those elicited by a physician.

However, the variation between assistant and physician (16% falling to 12% after discussion of symptom definitions) compares favourably with the agreement between physicians also noted in other series.^{5,6} We conclude from these studies that data elicited by paramedical staff are, in this particular situation, as reliable as those elicited by medical staff.

VALUE OF DATA

An attempt was made to assess the value of these data in a number of different ways. First we ran a computer analysis³ for each of the 154 patients based solely on the data elicited by the physician's assistant (table III).

TABLE III—Comparison between Computer-aided Prediction and "Final" Diagnosis in 154 Patients

"Final" Diagnosis	Computer Prediction				
	Functional	Cholecystitis	Duodenal Ulcer	Gastric Ulcer	Gastric Cancer
"Functional"	25	10	17	8	1
Cholecystitis	2	19	—	1	—
Duodenal Ulcer	2	3	46	6	—
Gastric Ulcer	—	—	4	4	—
Gastric Cancer	—	—	—	—	6

*After investigation. For discussion see text.

The 154 cases can be divided into two groups. Sixty-one patients were categorized as having "functional" dyspepsia; radiological investigation showed none of the organic lesions listed in table II, and they were returned to the care of their family doctor. These patients form a difficult group to analyse, for there is good evidence⁷⁻¹⁰ that some patients whose dyspepsia is originally categorized as "x-ray negative" eventually prove to have organic disease. For what it is worth, only 25 of these patients were assigned to the "functional" category by the computer.

Ninety-three patients were shown subsequently to have one of the "organic" lesions listed in table I, and were admitted to hospital for treatment. Here an analysis is more objective, and acting on the data elicited by the physician's assistant the computer assigned 89 of the 93 patients to one of other of the disease categories, and assigned 75 patients to the correct category. In discriminating between the common organic causes of dyspepsia the computer's accuracy was thus just over 81%.

This figure of 81% compares reasonably well with the computer's discriminatory accuracy (86%) in our earlier series of 200 cases, in which the computer was provided with data from the house surgeon's case notes. In addition, for those of the patients in the present series who were admitted to hospital, we were able to enter into the computer the data recorded in the house surgeon's case notes, the resultant accuracy in this series being 83%. Thus all one can say is that the data collected by the assistant are about as "valuable" to the computer as those collected by the house surgeon some weeks later when the patient was admitted to hospital.

Such a comparison, however, is not entirely appropriate, since as already stated the purpose of the physician's assistant in this study

was not to make a diagnosis, nor even to enable a computer to do so. The purpose of the assistant was to collect a detailed subset of clinical information which might help the clinician towards his own diagnosis. The crucial question therefore is this: Would the clinician, if provided with detailed information of this kind, improve his own diagnostic accuracy?

There is some evidence that he would. A further small group of 25 patients were selected at random from the three clinics studied. In practice, when these patients were first seen, a correct diagnosis was made at first outpatient contact in 11 of the 25 (44%). In the remaining 14 cases either a wrong diagnosis was made or the clinician found it impossible to formulate any firm diagnostic opinion based on the information then available.

The information elicited at first outpatient contact was recorded and given to four further clinicians from the department of surgery with the results shown in fig. 2. From this experiment we conclude that, basing a diagnosis upon the information elicited at first outpatient contact, very few clinicians could achieve an accuracy of over 50% even when pressed to make a firm diagnosis in every case.

However, the clinicians were also given the information elicited at the same outpatient contact by the physician's assistant. (The order in which the "routine" and "paramedical" data were presented to each clinician was varied, and time allowed to elapse between the two presentations.) As shown in fig. 2, all clinicians' diagnostic accuracy was substantially higher, usually around 75-80%, when presented with "paramedical" data, though none of the individual differences quite reach statistical significance.

Furthermore, in a (different) prospective consecutive series of 44 patients presenting to an outpatient clinic, where the clinician was presented with a "full" case history elicited in advance by the assistant, the overall diagnostic accuracy was 70% and the accuracy of discrimination between the common organic causes of dyspepsia was 92%. We conclude from this series of further studies that the provision of detailed information to the clinician at his first contact with the patient is of value in terms of diagnostic accuracy.

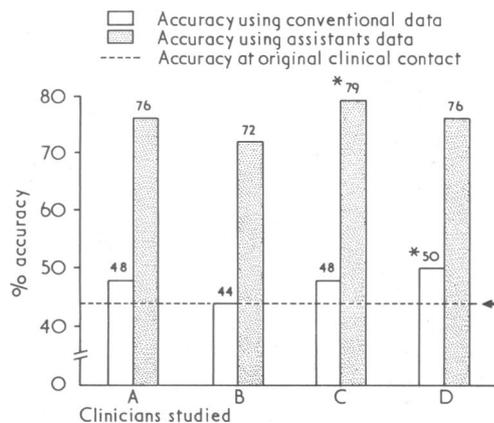


FIG. 2—Performance of four clinicians using "routine" and "paramedical" data in a series of 25 cases of dyspepsia. (Asterisk indicates that clinicians C and D each recognized one patient in relevant series, hence analysis restricted in these series to remaining 24 cases.)

Discussion

At the turn of the century it was asserted that most patients

presenting with dyspepsia could be correctly diagnosed solely on the basis of their symptoms, and to this extent there is perhaps little new about the present series of studies. But two features of the findings are possibly worthy of comment.

Firstly, in the diagnosis of dyspepsia the acquisition of detailed and predefined data improves most clinicians' diagnostic accuracy by about 20-30%. In practice this should have potential benefits in terms of cutting down negative radiological investigations and hastening definitive treatment for those who need it (such as patients with gastric cancer).

To take this latter example, in our own studies we have now seen some 27 patients with gastric cancer and correctly diagnosed 25 of them on the basis of their symptoms alone—at least 9 in the face of initially negative or doubtful radiological results.

Secondly, the task of interviewing the patient in this study was delegated to a non-medically qualified physician's assistant whose background had previously been in medical computing, and whose experience of dyspepsia was limited to an intensive training period of around three months. The experience gained in this small series of cases and this specialized area of medicine does not qualify us to discuss the role of "paramedical" personnel in any depth, but perhaps one or two points may be made. We were, for example, frankly surprised at the reaction which was encountered from the patients interviewed. This was far more favourable than we had expected; and it does appear that data gathering by non-medically qualified personnel is perfectly acceptable, with the important proviso that it is restricted to interviewing and is also an adjunct to a subsequent medical consultation rather than a replacement of it.

What place may be found for such an interview in routine clinical practice we cannot say, for that will obviously depend on a particular local situation. All that can perhaps be said is, when a doctor cannot (for whatever reason) conduct a detailed symptomatic interview of the type outlined with a patient suffering from dyspepsia, he should consider delegating part of this task to another member of the team who collectively care for the patient.

We are most grateful to our various surgical colleagues for permission to study patients attending under their care, and to Professor J. C. Goligher for his constructive advice and encouragement during the conduct of this study. One of us (J.C.H.) was aided by a grant from the Medical Research Council, which we also acknowledge with gratitude.

References

- Anderson, J. A. D., *Lancet*, 1968, 2, 97.
- Davis, R. H., and Williams, J. H., *British Medical Journal*, 1968, 1, 502.
- Horrocks, J. C., and de Dombal, F. T., *American Journal of Digestive Diseases*, in press.
- Horrocks, J. C., *Methods of Information in Medicine*, 1974, 13, 83.
- Vickery, D. M., in *Proceedings of Medinfo 74, First World Congress of Medical Informatics*. Amsterdam, I.F.I.P., in press.
- Gill, P. W., et al., *Methods of Information in Medicine*, 1973, 12, 108.
- Barford, A., in *Proceedings of World Congress of Gastroenterology*, p. 352. Baltimore, Williams and Wilkins, 1959.
- Cotton, P. B., *British Medical Journal*, 1973, 2, 161.
- Gregory, D. W., et al., *British Medical Journal*, 1972, 4, 519.
- Krag, E., *Acta Medica Scandinavica*, 1965, 178, 713.