

DIAGNOSTIC PROCESS

D. L. CROMBIE, M.D.

Birmingham

The *Oxford English Dictionary* defines "diagnosis" as "identification of disease by means of patient's symptoms, etc., formal statement of identification". It would seem from this strict definition that a diagnosis is no more than a label. The pathologist, however, would be dissatisfied if the diagnostic label did not imply a clearly defined aetiology and pathology. The general practitioner, on the other hand, who uses the diagnosis as a stepping stone to the management of any particular problem clinical or social, would be content often with something even less defined. This epitomizes the difference between the academic and the practical approaches: Cohen (1943) suggested that diseases should be relabelled in such a way that the anatomical site of the lesion, the functional disturbances and structural changes occurring and the causes of these disturbances and changes are indicated by the label. This is an ideal. He also stated that "All diagnoses are provisional formulae designed for action".

Of the three main reasons for making a diagnosis; to label the condition as in the *Oxford English Dictionary* definition; to satisfy scientific curiosity and to indicate the appropriate therapeutic action, the last is the one of most interest to the general practitioner. This paper is concerned with an analysis of the diagnostic methods used by a general practitioner and to establish the academic respectability of this process.

Method

This analysis was based on two groups of patients seen by the writer. The first group, Group A, was a consecutive series of patients, 140 male and 164 female, attending for the first time with any new conditions, during a period of 3 weeks in general practice in 1954. The second group, Group B, consists of all patients seen during the 4 months subsequent to this first 3

weeks period, who were referred by the writer for pathological investigations, a consultant's opinion, or for a mass-radiograph. All the patients from both groups were followed to the completion of their illness or for 12 months, whichever was the shorter.

The terms used in this analysis are defined as follows:

1. O = No diagnosis.
2. T = Tentative diagnosis (including cases where alternative diagnoses are possible or where the diagnosis indicates a symptom complex).
3. E = 1 or 2 but where in addition all the more serious diagnoses have been excluded.
4. F = Firm diagnosis. That is a diagnosis which has been made only after the usually accepted checks and confirmatory tests have been carried out but not necessarily all the possible tests and checks.

There were seven levels at which the diagnostic process could terminate.

1. H = History only.
2. H + LE = History and local examination (no undressing required).
3. H + SE = History and full examination of one system (undressing more or less completely).
4. H + FRE = History plus full routine examination.
5. Plus PS = Above, plus use of pathological and bacteriological services available to general practitioners.
6. Plus CS = Consultant opinion (inpatient or outpatient).
7. MX = Mass x-ray.

The inclusion of category E which covers those cases where all the more serious alternative conditions have been excluded, is a natural corollary to the statement that the general practitioner is interested in the diagnosis largely as a stepping stone to the management of the patient's problem.

It should be stressed at this point that the four most important factors in the background against which these figures were obtained are, firstly, that the figures refer to general practice; secondly, that the series is confined to one practice; thirdly, that the figures are based on one individual's methods of working and these are not necessarily the best or the most usual; finally, that the figures are based on the analysis of a process which is largely empirical.

Findings

The figures in the last column in tables I and II, give the total numbers of patients in each of these seven categories.

Only 16 patients in group A (table 1) out of a total of 304, were treated on the basis of a history only. However, more patients, 129, were treated on the basis of a history and local examination than those who received a full examination of one system, 106.

TABLE I
ALL NEW CASES SEEN DURING 3 WEEKS OF GENERAL PRACTICE (GROUP A)

| <i>Final level of diagnosis</i> | <i>Degree of accuracy</i> | <i>Totals</i> |
|---|---|---------------------------------|
| 1. History only .. | T = Tentative F = Firm | 14 } 2 } 16 |
| 2. History and local examination | T F | 51 } 78 } 129 |
| 3. History and full examination of one system | O = No diagnosis T E = Eliminating process F | 1 } 52 } 12 } 106 41 } |
| 4. History and full routine examination .. | O T E | 3 } 11 } 5 } 19 |
| 5. Any of above and pathological services .. | O T F | 1 } 3 } 2 } 6 |
| 6. Any of above and consultant's opinion .. | O T E F | 1 } 3 } 2 } 12 } 18 |
| 7. Any of above and mass radiograph .. | E | 10 10 |
| TOTAL | | 304 |
| Males = 140 | Females = 164 | |

Only 19 patients had a full routine examination.

Six patients were referred for pathological investigation, 18 for a consultant's opinion and ten for a mass radiograph. Whereas only two out of the 16 cases where the diagnosis was made on the history only (table 1), were classified as firm, this proportion rises to 78 out of 129 for history plus local examination.

Where a history and full examination of one system was carried out, the proportion of firm diagnoses falls to 41 out of 106 cases and where the history and full routine examination was carried out, no firm diagnoses were made at all. Where pathological investigations were considered necessary, 2 out of the 6 diagnoses made were considered firm. In the cases referred to a consultant, the

proportion of firm diagnoses rises to 12 out of 18. In table II, only the last three categories are catered for by definition and the proportions of firm diagnoses in each of the three groups are roughly the same as in table I.

The proportion of cases in group A where the diagnosis was classed as tentative, is naturally highest in the group where history only was the basis of the diagnosis but the second highest proportion occurs in the group where history and full routine examination had been carried out.

The proportion of diagnoses classed as E, that is where all other possible serious conditions had been eliminated, is also high in this group, 5 out of a total of 19, and is only surpassed by the figures for the final category (7), where all 10 were classed as E. This is not surprising when it is remembered that this group consists of all patients who were referred for a mass-radiograph. The figures for group B in table II show a similar trend.

TABLE II

ALL PATIENTS REFERRED FOR PATHOLOGICAL INVESTIGATIONS; CONSULTANT OPINION; OR MASS RADIOGRAPH, DURING THE SUBSEQUENT 4/12 (GROUP B).

| <i>Final level of diagnosis</i> | <i>Degree of accuracy</i> | <i>Totals</i> |
|---------------------------------|---------------------------|---------------|
| 5 | T | 4 |
| | E | 1 |
| | F | 3 |
| | | } 8 |
| 6 | T | 8 |
| | E | 5 |
| | F | 39 |
| | | } 52 |
| 7 | T | 6 |
| | E | 26 |
| | | } 32 |
| TOTAL | | 92 |
| Males = 49 | | Females = 43 |

Table III gives the totals of illnesses seen by the degree of diagnostic accuracy at the end of the diagnostic process. In only six cases was no diagnosis made at all (table III). This, when considered with the figures of 134 out of 304 illnesses where the diagnosis was classed as tentative in group A (table III), reflects the universal desire to give a condition a name of some sort rather than leave a blank. In both groups A and B less than half of the patients seen

had a firm diagnosis attached to their illness. In a study by the Research Committee of the College of General Practitioners (1958) in which only 11 practitioners participated, 55.5 per cent of all diagnoses were classed as firm. As one would expect, the proportion of illnesses in which the degree of accuracy of the diagnosis was classed as E, that is where all other serious conditions had been eliminated, tends to be higher in group B. This is because by definition the illnesses encountered in this group were either more serious or required specialized investigations to assist in the establishment of a diagnosis.

TABLE III

TOTALS OF ILLNESS BY DEGREES OF DIAGNOSTIC ACCURACY AT END OF DIAGNOSTIC PROCESS.

| | <i>No diagnosis</i> | <i>Tentative</i> | <i>Eliminating</i> | <i>Firm</i> | <i>Totals</i> |
|--------------------------------|-------------------------|------------------|--------------------|-------------|---------------|
| | (O) | (T) | (E) | (F) | |
| Group A .. (all new cases) | 6 | 134 | 29 | 135 | 304 |
| Group B .. (cases referred) | 0 | 18 | 32 | 42 | 92 |

In table IV an analysis is made of the changes in the degree of diagnostic accuracy between the various levels of the diagnostic process. The letters in the first vertical column of each table refer to the levels of the diagnostic process as defined on the first page. The figures in the subsequent vertical columns refer to the appropriate numbers involved in the transition from one diagnostic level to another. The figures are arranged under the appropriate change in the degree of accuracy involved in this transition. Of course, not all the possible permutations and combinations are given. The last three vertical columns indicate the totals for the change of diagnostic accuracy under three headings; the first, where the diagnostic accuracy was improved; the second, where it was unchanged; and the third, where a previously established level of diagnosis was reduced.

The transition from the history to a local examination upgraded the diagnostic accuracy in 80 cases and left it unchanged in 67. The equivalent figures for history to simple examination are 51 and 70. Where a full routine examination was carried out on the

TABLE IV
CHANGE OF DEGREE OF DIAGNOSTIC ACCURACY BETWEEN LEVELS OF DIAGNOSIS
(FOR MALES AND FEMALES COMBINED)

| <i>Group A</i> <i>Males = 140</i> <i>Females = 164</i> | | | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|------------------------|-------------|
| <i>Level of accuracy</i> | <i>O-O</i> | <i>O-T</i> | <i>O-E</i> | <i>O-F</i> | <i>T-T</i> | <i>T-E</i> | <i>T-F</i> | <i>E-E</i> | <i>F-F</i> | <i>F-E</i> | <i>Up</i> | <i>Un- changed</i> | <i>Down</i> |
| <i>Diagnosis level</i> | | | | | | | | | | | | | |
| H - LE | | 2 | | 8 | 59 | | 70 | | 8 | | 80 | 67 | |
| H - SE | 4 | 1 | | 1 | 62 | 12 | 37 | | 4 | 2 | 51 | 70 | 2 |
| H - FRE | 5 | | 1 | | 18 | 2 | | | | | 3 | 23 | |
| LE - SE | 1 | | | | 17 | | | | 8 | 1 | | 26 | 1 |
| LE - FRE | 1 | | | | 3 | 1 | | | | | 1 | 4 | |
| SE - FRE | 4 | | | | 12 | 1 | | | | | 1 | 16 | |
| - PS | 1 | | | | 3 | | 1 | | 2 | | 1 | 6 | |
| - CS | 1 | 1 | | | 2 | 1 | 7 | 1 | 5 | | 9 | 9 | |
| - MX | | | | | | 9 | | | | | 9 | 1 | |
| TOTALS | 17 | 4 | 1 | 9 | 176 | 26 | 115 | 1 | 27 | 3 | 155 | 222 | 3 |

| <i>Group B</i> <i>Males = 49</i> <i>Females = 43</i> | | | | | | | | | | | | | |
|--|--|--|--|--|------------|------------|------------|------------|------------|------------|-----------|------------------------|-------------|
| <i>Level of accuracy</i> | | | | | <i>T-T</i> | <i>T-E</i> | <i>T-F</i> | <i>E-E</i> | <i>F-F</i> | <i>F-E</i> | <i>Up</i> | <i>Un- changed</i> | <i>Down</i> |
| <i>Level of diagnostic process</i> | | | | | | | | | | | | | |
| General practitioner—P.S. | | | | | 6 | 1 | 1 | 1 | 3 | | 2 | 10 | |
| General practitioner— consultant | | | | | 9 | 3 | 8 | 1 | 30 | 1 | 11 | 40 | 1 |
| General practitioner—mass radiograph | | | | | 3 | 26 | | 2 | | | 26 | 5 | |
| TOTALS | | | | | 18 | 30 | 9 | 4 | 33 | 1 | 39 | 55 | 1 |

other hand, the diagnostic accuracy was only upgraded on three occasions and remained unchanged in 23. Where a full routine examination followed a simple examination of one system, only one diagnosis was upgraded thereby and 16 remained unchanged. The use of the pathological services in group A upgraded the diagnostic accuracy of only one case in 7 and left 6 unchanged. Equivalent figures for group B are 2 out of 12. A consultant opinion upgraded 9 and left a further 9 unchanged in group A and in group B upgraded 11 but left 40 unchanged. The use of mass radiography on the other hand, produced the highest proportion of increased accuracy in the diagnosis for any group. The proportion for group A being 9 out of a total of 19 and for group B, 26 out of a total of 31.

The figures for group A show that in only 5 cases out of a total of 147, where a local examination was first made, was it deemed necessary to proceed to a full examination and in only one of these cases was the degree of accuracy of the diagnosis upgraded. Similarly, in only 27 cases out of a total of 147, where a local examination was first made, was it deemed necessary to proceed to a simple examination of a system and that in none of these cases was the degree of accuracy of the diagnosis upgraded. The history provided the basis for treatment in 176 cases out of the total of 304 treated, that is either alone 16 cases or in conjunction with local, simple examination, or full routine examination where these provided no further information capable of upgrading the degree of accuracy of the diagnosis—160 cases.

Discussion

The feature distinguishing the general practitioner from practically all other practitioners of medicine is his close personal contact with his patient, the patient's background and the patient's relations over many years. When a patient attends his general practitioner with his current problem, the practitioner has in his mind, if not in his notes, a composite picture of the patient's past medical history, his home background, a knowledge of the difficulties which he may have encountered in his personal relationships at home and at work, his occupation, his personal attitude to ill health and, if he knows him well, his fundamental beliefs and drives.

It is against this background, where the current item of service is "just one page in the book" whose subsequent chapters may already be known or guessed at by the practitioner, that the diagnostic process

must be considered.

The most important and the most obvious conclusion is of course that the history of the case is the keystone of the diagnostic arch. Out of the 304 patients in group A, 176 were treated on the basis of information obtained from the history without the assistance of other aids, or where other aids gave no more useful information. This is a point that has been well established and it is not necessary to labour it further.

That more than half of the patients seen in this series from general practice were treated without a firm diagnosis being established and that full routine examination seldom added much additional information to that already gleaned from the history and simple or system examinations is explained by the following: firstly, many minor disabilities are self-limiting and require only expectant treatment and the diagnostic process therefore for minor disabilities need only be taken to the point at which sufficient information becomes available to establish that it belongs to this group; secondly, many patients attend with minor disabilities purely for administrative reasons; thirdly, the underlying pathology of many minor disabilities is unknown (for example, "rheumatic" disorders, respiratory catarrhs, gastro-intestinal upsets, transient pyrexias, skin lesions, and minor emotional disorders) and the diagnosis can only be tentative; fourthly, in many disease processes the present analytical weapons, laboratory aids and tests and so on, are unable to establish any individual subsidiary patterns within the main diagnostic complex. An example of this might be the difficulty of establishing in general practice the true aetiology of a pyrexia of unknown origin of short duration. These diseases, often called "influenzal chills" are probably caused by one of a large number of viruses as yet unidentified; finally and most important of all, it is often bad practice to strive too vigorously to establish the diagnosis of an obscure but minor physical disability when it is accompanied by a large or overwhelmingly important psychogenic element. In patients presenting with minor disabilities such as these it is often more important to exclude more serious possibilities than actually to establish a correct diagnosis. This applied to 29 patients out of a total of 304 in group A and 32 patients out of a total of 92 in group B.

The bulk of patients seen by general practitioners have illnesses which fall within the symptom complex groups mentioned above. While the organic element in illness encountered by general practitioners is less definite than the organic element of the selected illness

encountered in hospital practice the reverse is true for the emotional element. The emotional element is also relatively more important in illnesses encountered in general practice compared with hospital practice, and one of the most important functions of the general practitioner is to establish the relative importance of organic and emotional factors in a patient's illness as early as possible. There is, on the other hand, at hospital level, a bias in the clinical material towards serious organic disease with a relatively smaller emotional content and therefore an incentive always to seek for a satisfactory diagnosis, morphologically and aetiologically since such an answer is more often obtainable. Puzzles which always, or nearly always, have an answer are more interesting than those that often have none at all. This bias results from the effective preselection which is carried out by general practitioners.

A relationship exists between the accuracy of diagnosis that can be achieved for any condition and the presence or absence of effective therapy for that condition. The discovery of an effective treatment for any individual condition encourages the refinement of the symptom complex, which might previously have included that specific condition, into its respective parts. For example, congenital heart disease, once accepted as a diagnosis is now only the starting point of a diagnostic routine made essential by the advances in thoracic and cardiac surgery which have allowed certain types of congenital heart disease to be effectively treated. For similar reasons a firm diagnosis will nearly always be established in purely surgical conditions or where the patient invariably dies from the particular disease.

Because the history gives most of the answers and because the extra information which can be gleaned from the more time-consuming examinations or special examinations is relatively so much smaller, at any rate in general practice, more and more reliance is quite rightly placed on the history. The art of good general practice is surely the ability to maintain the balance between the maximum use of the intuitive processes with the full use of the logical method when the intuitive process breaks down or fails to give a satisfactory answer. An understanding of those intuitive processes which underlie this ability can be partly conveyed theoretically by the teaching of statistical method in the assessment of probabilities and practically by a demonstration of the psychiatrists' or general practitioners' approach to clinical problems.

An over-emphasis on the logical or scientific approach in teaching

must be due partly to its scientific "respectability", partly because the teaching of the so-called scientific or logical method is easier than the transmission of processes which depend on intuition; and partly because intuitive methods have a more limited use in hospital practice than in general practice. This applies particularly to the special departments of teaching hospitals.

The writer has a feeling that the best clinicians among his teachers made their assessments largely by intuitive methods and clothed this assessment in a coat of logic for the benefit of the students.

Intuitive methods, of course, are merely the use of pathways which have been mapped out in the thought processes of the brain by laborious and continuous use and to this extent are based originally on logical or scientific method.

While it is true that much use is made of diagnostic shortcuts in general practice, often for very good reasons, their limitations must be constantly held in mind. The only alternative to a diagnostic *cul-de-sac* where empirical methods have been used, is a full and careful routine examination. That this is often neglected in general practice can be explained but not excused by the fact that this sometimes tedious procedure so often yields no further useful information. The hospital physician sees 18 of the cases in the series of 304 patients who made up group A and does not perhaps realize the background from which these 18 cases came. The writer, and he suspects, most of the practitioners of his generation, were brought up to believe that the display of anything less than the full panoply of the routine examination on all possible occasions was an abomination. The hard facts of life in general practice dictate a different approach for reasons already described; an approach which is worked out painfully by the young practitioner and aggravated by the deficiencies of a diagnostic classification which forces either an organic or psychogenic descriptive label on any illness, when the chances are that both these elements are relevant. The transition to the more effective approach appropriate to diagnosis in general practice engenders a guilt complex which takes a long time to overcome and this may be one of the main reasons for the belief that it takes 10 years in general practice to make a good general practitioner.

In hospital teaching practice, quite correctly, the emphasis is on the analytical approach as distinct from the empirical, but it is just as well to acknowledge that even in hospital practice empiricism has its place, for what substitute is there in the therapeutic field for

clinical acumen, that vague and ill-defined attribute without which no man can be a good physician.

The art of medicine is surely the ability to be effective with scientifically inadequate data. This applies equally to the organic and emotional components of disease.

Summary

The writer has tried by the analysis of this material from his practice to show that there are very many good reasons for the way in which the average general practitioner approaches the diagnosis of his patients' illnesses and that it may not be fully appreciated why these reasons are good and academically respectable. It must be remembered that the establishment of a diagnosis is only one link in a chain which begins when the patient presents the practitioner with his problems. The solution of this problem can often be achieved despite the impossibility of reaching a diagnosis.

REFERENCES

- Cohen, H. (1943), *Lancet*, 1, 23.
 Records Unit Working Party (1958), *J. Coll. gen. Practit.*, 1, 107.

'STROKE' ILLNESS

The Chest and Heart Association has devised a word and picture chart for the use of patients suffering from strokes. The chart contains on one side, a number of pictures of such things as toilet preparations, dinner plate, tumbler, handkerchief, bed-pan, urinal, spectacles, pencil and pad. On the other side are some of those sentences which are so frequently needed by the sick—"may I have the window open/closed," "please turn the radio on/off etc.," "I am cold/hot", and an alphabet of large, easily readable letters.

These charts will prove of great service to patients suffering from asphasia. The only improvement which could be made is to have them printed on washable cards.

Copies may be purchased at 1s. 0d. each or 7s. 6d. for ten from The Chest and Heart Association, Tavistock House North, Tavistock Square, London W.C.1.