The Importance of Coding Presenting Symptoms

S. T. BAIN, M.D., *Toronto* and
W. B. SPAULDING, M.D., F.R.C.P.[C], F.A.C.P., *Hamilton, Ont.*

THE study of diseases has been greatly extended and simplified by the uniform coding of diagnoses in most hospital record rooms. With relative ease the charts of all in-patients having the same recorded diagnosis can be drawn for perusal. Standardized coding, in the form of the widely accepted and invaluable International Classification of Diseases,[1] permits records from many hospitals to be pooled to enlarge a series of cases, or to compare experience in different hospitals. Data-processing techniques with computers have greatly increased the usefulness of medical records, as can be seen by co-operative investigations carried out by hospital staff members working with the staff of the Commission on Professional and Hospital Activities, Ann Arbor, Michigan.[2-4] The time is ripe to add a new dimension by coding presenting symptoms as well as final diagnoses. With the available new tools and techniques the understanding of symptoms can be increased, and the provision of numerical data about diagnostic probability will enhance the physician's skill in differential diagnosis.

The word symptom can be given both a general and a restricted meaning. The general meaning includes any clinical evidence of disease noted by the patient or his doctor. Used in this sense all physical signs are symptoms. We prefer more precise usage which restricts symptoms to *what patients report.* The policy in our medical clinic has been to record symptoms in the patients' own words. Because patients often misunderstand medical terms, the use of everyday words has been encouraged. The only physical signs which qualify as symptoms in the more precise meaning of the word, are observations reported by the patient himself. Chapter XVI in the International Classification of Diseases[1] is entitled "Symptoms, Senility and Ill-defined Conditions". Although this chapter does provide code numbers for the common symptoms discussed in this paper, we found too many shortcomings to adopt the classification as a comprehensive basis for the study of symptoms. In this classification what are called symptoms have been recorded in non-medical as well as medical terms and include physical signs and diagnoses. For example, 781.0 "Disturbances of vision except defective sight" includes "emotional blindness", a term with diagnostic implications, and "hemianopsia", a word almost never used by patients; 781.1 "Oculomotor disturbances" includes "nystagmus", nearly always a physical sign unnoticed by the patient, rarely a subjective symptom. Diagnostic terms such as "Encephalopathy", 781.8, and "Pylorospasm", 784.2, are classified as symptoms. Another drawback is the lack of scope for coding some regional symptoms. For example, "Pain in limb", 787.1, is not subdivided further, with the result that the components of the limbs are not identified and no distinction is made between upper and lower limbs.

This paper describes the design of a symptom code and how it was used to obtain numerically weighted differential diagnoses for common symptoms. The approach employed is relevant to any clinical setting whether it be family practice or consultant work in the home, office or hospital. While it remains to be seen whether the results obtained in this study have general validity, the method is easy to use, can be widely applied and should lead to clearer insight into the significance of symptoms in diagnosis.

METHOD

Using the medical records of 500 consecutive, new outpatients attending the medical clinic, we listed their chief or presenting symptoms or problems. These patients, all over age 14 and from lower income groups, attended this large, downtown general hospital to obtain medical care. About one-third of the clinic staff of approximately 25 doctors were general practitioners, the remainder chiefly internists. Final-year medical students took an active part in the investigation and treatment of most patients. The clinical problems were those of general medicine, and excluded surgery, obstetrics and dermatology.

During this preliminary scrutiny we found that the symptoms could be classified in one of a number of ways: anatomically; by systems; in a general grouping; or in a group of varied reasons for attending the clinic. Whenever a symptom occurred in 1% or more of the patients, that is, in at least five of the 500, the symptom was assigned a code number. When a

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Reprint requests to: Dr. W. B. Spaulding, Faculty of Medicine, McMaster University, Hamilton, Ontario.

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TABLE I.—THE SYMPTOM CODE

Anatomical regions	*Symptom*
10 Abdomen—pelvis	1 Aching
20 Back	2 Discomfort, distress, tightness, squeezing, cramps, pressure
30 Breast	3 Pain
31 Chest	4 Soreness, tenderness
40 Head	5 Stiffness
41 Eye	6 Swelling, tumour, lump
42 Ear	7 Tingling, burning or numbness, pins and needles
43 Nose	8 Tremors
44 Throat	9 Weakness, paralysis
45 Mouth and tongue	0 All others (including deformities) laceration, coldness
46 Face (including lips)	
50 Neck	
60 Lower extremity	
61 Ankle	
62 Foot	
63 Hips	
64 Knee	
65 Leg	
66 Thighs	
67 Toes	
70 Upper extremity	
71 Arm	
72 Elbow	
73 Fingers	
74 Hand	
75 Shoulder	
76 Wrist	
80 External genitalia	
90 Multiple joints	
00 Generalized and unspecified	

Other symptoms arranged by system	
General	
010	Weight—excess, loss or change
011	Excessive thirst, polydipsia
012	Faintness, light-headedness, blackouts
013	Fatigue, tiredness
014	Fever and/or chills
015	Hot flushes and sweating, feels hot
016	Insomnia
017	Malaise and rundown
018	"Multiple complaints"
019	Other
Emotional	
020	Depression, crying, unhappy
021	Irritability
022	Nervousness
023	Worried, restless, tense
024	Other
025	Fear of specified disease
026	Personal problems
Skin and mucous membrane (including mouth, tongue)	
030	Colour change (including pallor, jaundice)
031	Inflammation (including boils)
032	Itching
034	Textural change
035	Rash
036	Other
Nervous	
040	Disordered gait, unsteadiness, clumsiness
041	Disorders of speech
042	Dizziness, giddiness
043	Loss of consciousness (including fits, epilepsy)
044	Other
045	Somnolence
046	Loss of memory
047	Mental deterioration, confusion
Eye, ear, nose and throat	
051	Bleeding
052	Deafness
053	Discharge
054	Double vision
055	Failing or blurring vision, shadows
056	Head noises (including ringing)
057	Other ear, nose and throat symptoms
058	Other disturbances of the eye
Respiratory and cardiovascular	
061	Colds
062	Cough
063	Dyspnea
064	Hemoptysis
065	Hoarseness
066	Palpitations and tachycardia
067	Sputum
068	Wheezing and asthma
069	Other (including bad breath, hiccoughs)
Gastrointestinal	
070	Anorexia
071	Belching, bloating, gas, indigestion
072	Changed appearance of stool (including consistency, colour, blood)
073	Constipation
074	Diarrhea
075	Dysphagia
076	Hematemesis
077	Nausea
078	Regurgitation, vomiting, retching
079	Other
080	Heartburn
Genitourinary	
081	Dysuria, including burning
082	Frequency and nocturia
083	Genitourinary discharge
084	Menstrual disorders
085	Polyuria
086	Urinary bleeding
087	Other urinary symptoms
088	Other genital symptoms
Miscellaneous	
090	No *chief* complaint recorded for an *incidental* diagnosis
091	For assessment, no chief complaints, including "wishes check-up"
092	Self-diagnosis, no chief complaints
093	Ward follow-up (if chief complaints, code separately)
094	For investigation of specific abnormality
095	None recorded

symptom occurred in less than 1% of the patients, we placed it with one or more related symptoms, or in a category such as "other" (see Table I). Where it appeared that the patient used different words to describe a symptom already listed and coded, the same code number was used, for example, weakness of a limb and paralysis of a limb were assigned the same number. Table I contains the complete symptom code and should be consulted for examples of these points.

In this particular symptom code an anatomical part as well as a system is designated by the first two digits of a three-digit number. The symptom relevant to the part is given the last

TABLE II.—SUMMARY OF FINDINGS

Chapter of I.C.D.†	Authors' descriptive term	Presenting symptoms: Abdominal pain	Chest pain	Dyspnea	Headache	Fatigue	Cough	Back pain	Change in weight*	Nervousness	Dizziness
I											
II	Hodgkin's disease									1	
	Brain tumour				1						
III	Thyrotoxicosis					8				12	
	Endocrine, excluding thyrotoxicosis			5		16					
IV	Hematological					19					
V	Psychiatric	143	130	38	159	142	6	37		121	53
VI	Neurological							7			7
	Cerebrovascular (including migraine)				35						16
	Parkinsonism									1	
	Aural										11
VII	Cardiovascular		169	175		23	12				12
VIII	Respiratory		61	118	29	21	209	5			6
IX	Peptic ulcer	97									
	Gallbladder disease	20									
	Structural, excluding peptic ulcer, gallbladder disease	114	18			6		4			
	Spastic colon	30									
	Other functional gastrointestinal disorders	32									
X	Genitourinary					5		13			
XI											
XII											
XIII	Musculoskeletal		59		9	2		73			
XIV											
XV											
XVI	Undetermined	78	49	13	39	27	18	21		7	22
XVII											
	Total distributed in above categories	514	486	349	272	269	245	160		142	127
	"Other" (i.e. undistributed)	0	19	20	25	11	2	5		0	7
	Total.....	514	505	369	297	280	247	165		142	134

*"Change in weight" has not been subdivided; to provide useful information it should have been divided into "gain in weight" and "loss of weight" initially, but we failed to do so.
†I.C.D. = International Classification of Diseases.

digit. Although a three-digit code served our needs (providing up to 999 possibilities), it would be quite feasible to use a four- or five-digit code if it were important to provide more possibilities. Using the code in Table I, the number for pain in the neck would be 503 (neck-50 followed by pain-3).

With this code it was possible to assign a number to each of the chief complaints of the 500 patients. The code proved adequate as the number of patients in the study increased.

An I.B.M. card was used to collect data on a further 4000 consecutive patients new to the clinic. The clerical data were entered by a secretary; the clinic staff doctor who had seen the patient entered the chief complaints and the initial diagnosis at the time of the first visit. About six weeks later the authors completed the card, including the coding of symptoms and final diagnosis. All final diagnoses were coded using the International Classification of Diseases.[1] If there was doubt about some of the data, the medical record and card were returned to the doctor responsible, for clarification. Staff doctors were directed to record the diagnosis as "undetermined" where reasonable doubt existed.

FINDINGS

Table II contains, in summary, most of the findings. In Table III the presenting symptoms are ranked in order of frequency. Apart from its interest in showing which are the most common symptoms in this general medical clinic, the data allowed us to decide which symptoms to study more fully, later.

In preparing the tables of differential diagnosis (IV-XII) there have been a number of objectives: (a) to aid in the remembering of some of the findings by keeping the number of categories small; (b) to emphasize, where appropriate, the diversified nature of the causes of some common symptoms; (c) to permit the frequency of psychological disorders to be compared with that of other diagnoses; (d) to show which symptoms were most difficult to diagnose by keeping distinct the category "undetermined"; and (e) to use a broad brush and avoid listing the multitudinous diagnoses included in many of the categories.

TABLE III.—MOST COMMON PRESENTING SYMPTOMS IN 4000 PATIENTS

		%
1.	Abdominal pain	13
2.	Chest pain	13
3.	Dyspnea	9
4.	Headache	7
5.	Fatigue	7
6.	Cough	6
7.	Back pain	4
8.	Change in weight	4
9.	Nervousness	4
10.	Dizziness	3
		70

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TABLE IV.—CAUSES OF ABDOMINAL PAIN

		%
Structural		
All causes except peptic ulcer, gallbladder disease	22	45
Peptic ulcer	19	
Gallbladder disease	4	
Non-structural		
Psychiatric	28	40
Spastic colon	6	
Other functional gastrointestinal disorders	6	
Undetermined		15
Total		100

The frequency of psychiatric diagnosis as the cause for abdominal pain (Table IV) is striking, exceeding that of each of the other diagnostic categories. The structural disorders (including peptic ulcer and gallbladder disease) total 45%; or, stating the findings with a different emphasis: in more than half the patients no structural disease was discovered. Psychological factors are often important in patients suffering from symptoms related to peptic ulcers, spastic colon and other functional gastrointestinal disorders. Evidently there is good reason to look for psychological disturbances which might be causal or aggravating factors related to the abdominal pain, with the knowledge that in this series such a relationship was considered to be demonstrable in more than half the patients.

TABLE V.—CAUSES OF CHEST PAIN

	%
Cardiovascular	33
Psychiatric	26
Respiratory	12
Musculoskeletal	12
Remainder	17
Total	100

In the causes of chest pain (Table V) four diagnostic groups stand out, with cardiovascular, predominantly arteriosclerotic heart disease, heading the list which also includes psychiatric, respiratory and musculoskeletal. Of the 169 patients considered to have a cardiovascular cause for chest pain, 145 of the diagnoses were arteriosclerotic heart disease. Psychiatric disorders are a fairly close second to cardiovascular and frequently present diagnostic difficulties, particularly in deciding whether or not the pain originates from cardiac ischemia.

Unlike the other common symptoms referred to in this paper (except for cough, Table IX), dyspnea (Table VI) is very likely to be caused by structural disease, chiefly cardiovascular or respiratory (79%). Functional hyperventilation and sighing respirations are certainly encountered but more commonly in younger patients in whom structural disease is less frequent.

TABLE VI.—CAUSES OF DYSPNEA

	%
Cardiovascular	47
Respiratory	32
Psychiatric	10
Remainder	11
Total	100

TABLE VII.—CAUSES OF HEADACHE

	%
Psychiatric	53
Undetermined	13
Cerebrovascular (including migraine)	12
Respiratory (chiefly upper)	10
Remainder	12
Total	100

With the single exception of nervousness, headache (Table VII) led all the other symptoms in its relationship to psychiatric diagnoses. If one considers migraine as often having a relationship to situational stress, then the importance of psychiatric evaluation in patients with headache is emphasized further. In this group about 60% could be expected to have evidence of psychiatric disturbance.

TABLE VIII.—CAUSES OF FATIGUE

	%
Psychiatric	50
Undetermined	10
Endocrine	9
Cardiovascular	8
Respiratory	8
Hematological	7
Carcinoma—various sites	3
Gastrointestinal	2
Renal	2
Obesity	1
Arthritic	<1
Malnutrition	<1
Total	100

The causes of fatigue (Table VIII) are strikingly varied and numerous. Where more specific symptoms and pathognomonic physical signs are absent, all the resources of the physician may be required to arrive at the correct diagnosis. The differential diagnosis of fatigue based on a more detailed analysis of the findings in this group of patients has been discussed in a previous publication.[5]

TABLE IX.—CAUSES OF COUGH

	%
Respiratory	85
Cardiovascular	5
Psychiatric	2
Remainder	8
Total	100

Cough (Table IX) is the symptom, beyond all others, with a very common structural basis (90%, of which all but 5% were instances of respiratory disease). If these figures are valid, a psychiatric diagnosis should only be made with circumspection. The so-called "nervous" cough, relatively speaking, is unlikely to bring the patient to the doctor.

TABLE X.—CAUSES OF BACK PAIN

	%
Musculoskeletal	44
Psychiatric	22
Undetermined	13
Genitourinary	8
Remainder	13
Total	100

Little comment need be made about the causes of back pain in Table X. Psychiatric disorders are common and difficult to distinguish from some of the vague, presumably musculoskeletal syndromes.

Two diagnostic groups predominated in the causes of nervousness (Table XI): psychiatric and thyrotoxicosis with the ratio of frequency being 10:1. Most of the patients giving their chief complaint as nervousness are in lay terms also stating their diagnosis.

TABLE XI.—CAUSES OF NERVOUSNESS

	%
Psychiatric	85
Thyrotoxicosis	8
Remainder	7
Total	100

The high percentage of psychiatric disturbances causing dizziness (Table XII) is interesting. Many of these patients did not have true vertigo but were describing a variety of disorders of equilibrium, purely subjective. Cerebrovascular and cardiovascular disorders were believed responsible in about one-fifth of the patients. The low incidence of aural (8%) and neurological (5%) causes emphasizes the need for a careful analysis of the symptom (and of the psychological state) before concluding that disorders of these systems are likely to be responsible.

TABLE XII.—CAUSES OF DIZZINESS

	%
Psychiatric	40
Undetermined	16
Cerebrovascular	12
Cardiovascular	9
Aural	8
Neurological	5
Remainder	10
Total	100

Table XIII is included to emphasize the relative diagnostic frequency (or infrequency) of these lesions. While no physician would condone a superficial attempt to find a malignant neoplasm as a cause of these common presenting symptoms, it is well to have a perspective. In this group, even in the patients with fatigue, cough and back pain, who were most likely to have neoplasms, the odds were better than 30 to 1 against such a cause being found.

TABLE XIII.—MALIGNANT NEOPLASM AS CAUSE OF SYMPTOMS

Symptom	*No. of malignant neoplasms*	*No. of patients*	%
Abdominal pain	10	514	2
Chest pain	5	505	1
Dyspnea	5	369	1
Headache	1*	297	<1
Fatigue	9†	280	3
Cough	8	247	3
Back pain	5	165	3
Nervousness	1	142	1
Dizziness	1	134	1

*A meningioma, but included because of potentially lethal course.

†Includes two cases of leukemia.

DISCUSSION

The approach used has been epidemiological in the sense that a population has been studied. The study group, consisting as it did of consecutive new patients at a hospital clinic, was certainly not a representative sample of adults in the city, for economic, geographic and medical factors have had a part in determining whether the patient came to the medical clinic. The data are, at this stage of investigation, only relevant to the patients studied. If some of the findings are confirmed by similar work carried out elsewhere, generalizations will begin to be permissible. Despite the criticism that the study group was not representative of any defined population, one need not be pessimistic about

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TABLE XIV.—SOME SIGNIFICANT FINDINGS* IN THE 4000 PATIENTS

	% with positive findings
Physical examination	53
Radiography	13
Laboratory	18
Emotional disorder	30
None	11

*A significant finding is one considered relevant to the presenting symptom or symptoms.
The total exceeds 100% because some patients had significant findings in more than one category.

the usefulness of future investigation along these lines. Most of what we know about the clinical details of disease is derived from study of patients who have been admitted to teaching hospitals, a highly selected group estimated to constitute less than 0.2% of all adults sick at any given time.[6] Furthermore, it should be possible to extend the study of symptoms to community practices and to "healthy" persons having routine medical examinations.

Most symptoms are subjective, depending on the patient's report of how he feels, and often not objectively verifiable by the physician. Fatigue and pain are obvious examples. Thus one is studying "soft data" and has to accept that patients are nearly always untrained, often apprehensive and sometimes suggestible observers. Nonetheless symptoms are of the greatest clinical importance: most patients consult physicians because of concern about some feeling of ill-health. Furthermore, analysis of the incidence of abnormal physical findings and abnormal laboratory (including radiographic and pathological) examinations relevant to the presenting symptoms (Table XIV) in this group of patients corroborates the often-taught opinion that the analysis of symptoms as part of skilful history-taking is of fundamental importance in diagnosis. Much interest has been shown in the possible uses of computers in differential diagnosis.[7] Before the full potential of the computer can be realized, a tremendous amount of work must be done to advance beyond the present rudimentary stage of knowledge concerning symptoms and diagnostic probability.

This study has been confined to presenting symptoms, a fact which probably distorts the frequency of causation of the symptom in favour of more acute, more distressing or more persistent diseases. Presenting symptoms were chosen to take advantage of the fact that commonly the doctor's efforts are directed towards understanding or diagnosing the presenting symptoms. Minor complaints elicited in the functional inquiry are often considered irrelevant, not requiring further investigation.

The diagnoses arrived at have varying degrees of reliability and objectivity. It is obvious that there is a spectrum of certainty and uncertainty in diagnoses.[8] One example of a highly reliable diagnosis as the cause of a symptom would be pernicious anemia with confirmatory findings on study of bone marrow, serum levels of vitamin B_{12}, and impaired absorption of vitamin B_{12} improved by intrinsic factor. If such a patient had tingling fingertips which, with appropriate treatment, disappeared along with all the other findings, most would accept pernicious anemia as being causally related to the symptom. At the other end of the scale are obscure diagnoses such as "muscular rheumatism", "intercostal neuralgia" or "functional dyspepsia". Such terms lack precision because it is difficult or impossible to know what is malfunctioning and why. Psychological disturbances are often fairly easy to identify if care is taken to obtain the personal history and to assess the patient's personality, but the diagnostic terms used to describe psychological disturbances lack precision. One doctor may favour the term "anxiety neurosis", another "psychoneurosis", another "tension state", and yet all may be talking about the same patient. In this study we have tended to group such terms together and in making such decisions to be guided by the International Nomenclature of Disease.[1] The majority of the patients with psychiatric disorders were psychoneurotic; only a few were psychotic. Without discounting these difficulties it should be said that each patient had what an experienced doctor considered to be an adequate history and physical examination, as well as routine urinalysis, hemoglobin determination, blood smear and chest radiograph. There was no financial barrier to further investigation or consultation and these were readily available.

The prevalence of disease varies in communities for reasons such as season of the year, epidemics, immigration and socioeconomic changes. Our observations were made without controlling these variables. This is another reason for using broad diagnostic categories and limiting the number of categories, thereby avoiding a misleading appearance of validity by recording much detail. More precise studies, focussing on, for example, European immigrants of a certain age, could be carried out to see whether the differential diagnosis of certain symptoms varied significantly from that of native-born individuals of the same age.

The code was designed for our population of patients attending the clinic. It would require

modification in other settings, particularly if children and pregnant women were included. This code might be used in another adult general medical clinic, but it would be advisable to test it out in a preliminary way before embarking on similar studies. Anyone undertaking such a study would be wise to record presenting symptoms first in a small sample of patients to determine which have a certain minimum incidence (we chose 1%), and then use a code similar to the one described in this paper but modified to fit the findings of the sample.

Some colleagues have expressed the fear that such numerical data about diagnostic probability will encourage a slipshod approach to patients. For example, if we look at headache (Tables VII and XIII) it may well have been that the only patient with a potentially lethal, but curable cause was the one with a meningioma. The other 296 patients required predominantly psychotherapy and drug therapy. This view appears to underestimate the conscientiousness of doctors who not only want to diagnose the relatively rare meningioma, but want to understand, and if possible lead the patient to understand, the genesis of the symptom no matter what it may be. An important part of diagnosis involves the early, not late, inclusion of a psychological appraisal by the doctor first seeing the patient, a point emphasized in many of the tables.

Summary A numerical symptom code has been devised to aid in collecting and correlating data from large numbers of patients. The commonest presenting symptoms in 4000 consecutive new patients attending a general medical clinic in a teaching hospital have been identified. In decreasing order of frequency the symptoms were: abdominal pain, chest pain, dyspnea, headache, fatigue, cough, back pain, change in weight, nervousness and dizziness. For individual symptoms, numerically-proportioned differential diagnoses have been tabulated. Psychological and psychosomatic disorders were impressively common: abdominal pain 40%, chest pain 26%, headache over 50%, fatigue 50%, back pain 22%, nervousness 85% and dizziness 40%. These and other findings in the study broaden perspective in taking histories, examining and further investigating individual patients. Modern methods of data collection provide opportunities to increase our understanding of symptoms and to make differential diagnosis more precise.

Résumé Les auteurs ont mis au point un code numérique applicable aux symptômes cliniques, code qui a été conçu en vue de recueillir des renseignements chez un grand nombre de malades et d'établir entre eux des corrélations.

On a ainsi répertorié les symptômes dont se plaignaient le plus couramment 4000 nouveaux malades, pris consécutivement, et qui fréquentaient une clinique médicale dans un hôpital d'enseignement.

Dans l'ordre de leur fréquence décroissante, ces symptômes ont été: douleur abdominale, douleur thoracique, dyspnée, céphalée, fatigue, toux, lombalgie, changements de poids, nervosité et étourdissements. Quant aux symptômes individuels, des diagnostics différentiels numériquement proportionnés ont été catalogués.

Les troubles psychologiques et psychosomatiques ont été extrêmement courants: douleur abdominale 40%, douleur thoracique 26%, céphalée plus de 50%, fatigue 50%, lombalgie 22%, nervosité 85% et étourdissements 40%.

Ces statistiques, ainsi que d'autres données tirées de cette étude, élargissent les perspectives quant aux moyens de prendre les anamnèses, d'examiner et d'étudier plus à fond certains malades.

Ces méthodes modernes d'obtention des renseignements ouvrent de nouvelles voies à notre compréhension de la signification des symptômes et nous permettront de poser des diagnostics différentiels plus précis.

We are indebted to the staff doctors who collected these data and to the clerical and nursing staff who took part in the study. Drs. Helen Morley and Eleanor Wood contributed to the development of the method. A number of others, as medical students, have worked on the project, in particular Drs. Peter Korhonen and David Naiberg.

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