DIAGNOSTIC ERRORS IN REFERRALS TO THE ZAGREB FEVER HOSPITAL

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Errare humanum, corrigere philosophicum est

THE MOST sensitive indicators are those relating to the quality of work. There are many indices of various degrees of objectivity for the evaluation of the quality of the doctor's work. One of them concerning hospital physicians is the degree of agreement between clinical diagnosis and postmortem findings [1]. A similar indicator for non-hospital doctors is the degree of agreement between their referral diagnosis and hospital discharge diagnoses. Since in Yugoslavia there are a great many contradictory opinions of the quality of work of doctors in general, and general practitioners in particular, and since they are often based on impressions and emotions rather than on objective studies, we decided to analyse the degree of agreement between referral diagnoses of the cases sent to the Zagreb fever hospital (hospital for contagious diseases) and the discharge diagnoses of this hospital. Although aware of deficiencies of this kind of study which relates only to a single hospital, and a specialized one at that, we decided to use it for the following reasons:

1. The fever hospital is one of the hospitals in which most case histories, in addition to referral diagnoses, contain the name of the physician who referred the patient to the hospital. This makes the subsequent identification possible.

2. Patients are for the most part sent to the fever hospital directly, without any preceding consultation with another doctor specialist or laboratory analysis.

3. Though a specialized hospital, this is a hospital for various diseases (as its leading staff put it), and the range of referral diagnoses is very wide.

J. ROY. COLL. GEN. PRACTIT., 1968, **16**, 220

The analysis comprised all the case histories of the fever hospital from October 1966 to February 1967. Only recent case histories were analyzed because in the old ones it would certainly have been difficult to trace the health institutions in which the doctors were working owing to their frequent moves from one to another, and it would not have been possible to collect all the information needed.

In the period surveyed a total of 1,040 case histories containing data on the referring doctor were available for the study. We do not know if similar investigations have ever been undertaken in Yugoslavia, but in the foreign literature there are reports on similar studies in Great Britain, U.S., U.S.S.R., and the Netherlands[2 3 4 5] mostly relating to internal diseases and injuries.

Out of 1,040 patients, 57 were transferred from other hospitals, while the remaining 983 patients were sent to the fever hospital by 364 non-hospital doctors (table I). In order to give a rough picture

TABLE I

DISTRIBUTION OF REFERRED PATIENTS ACCORDING TO THE DOCTORS' SPECIALITIES

Doctors making referrals		*Number of patients sent to the fever hospital*
Number	*Speciality and working place*	
	General practice:	
211	General practitioners (GP)	546
50	Specialists in, or specializing, general medicine (SPGP)	113
	Child health services:	
34	Pediatricians (SPPED)	119
7	General practitioners (GPPED)	30
	School child health services:	
22	Specialists (SPSCH)	52
9	General practitioners (GPSCH)	43
	Occupational health services:	
10	Industrial physicians (SPOH)	24
16	General practitioners (GPOH)	47
5	Other specialists (OSP)	9

of the working experience of the doctors that made the above specified referrals, their age structure is given in table II.

As these doctors referred to the fever hospital only 983 patients, the average number of the patients referred to the hospital in the period surveyed by each doctor was 2.7. Yet, according to the doctors' specialities, this average value is somewhat different (table III).

All the patients were classified according to *referral* diagnoses. If there were several diagnoses, the *first one* was taken as the referral, or discharge, diagnosis.

Out of 1,040 referred and discharged patients, in 640 cases (61.5 per cent) referral and discharge diagnoses were *fully* in accord; in 144 cases (13.9 per cent) the referral diagnosis was *wrong*; in 146 cases (14 per cent) it was *similar* to the discharged one, and in 110 cases (10.6 per cent) it was indifferent or *symptomatic*, such as pyrexia of

TABLE II

AGE GROUPS OF THE DOCTORS MAKING REFERRALS (INDICATORS OF WORKING EXPERIENCE)

Age (years)	*General practice*		*Child health services*		*School child health*		*Occupational health services*		*Other specialists (OSP)*	*Total*
	GP	*SPGP*	*SPPED*	*GPPED*	*SPSCH*	*GPSCH*	*SPOH*	*GPOH*		
Over 66	2									2
52–65	13	1	2		1			1		18
46–51	13		2	1	1					17
41–45	29	10	18		8	1	2	5	3	76
36–40	50	22	12	2	8	2	6	7		109
31–35	45	15		1	3	3	1	1		69
26–30	47	2		3		3	1	1		57
Under 26	1									1
Un-known	11				1			1	2	15
Total	211	50	34	7	22	9	10	16	5	364

unknown origin (*febris e causa ignota, status febrilis in observatione* etc). Diagnoses followed by a question mark (e.g. measles?) were taken as if there was no question mark at all.

A referral diagnosis was considered *accurate* if it was absolutely identical with the discharge one; *similar* if relating to the clinical picture bacteriologically and clinically identical with the verified discharge diagnosis; for instance the referral diagnosis of acute gastro-enteritis was considered similar to the discharge diagnosis of

gastroenterocolitis acuta infectiosa, and *colitis chronica* similar to *colitis chronica ulcerosa* etc.

Equally, any *secondary* referral diagnosis was considered a *similar* diagnosis if it corresponded to the *main* discharge diagnosis (e.g. referral diagnoses: orchitis, parotitis; discharge diagnosis: mumps). In most cases 'similar' diagnoses had the same code according to the *International classification of diseases*.

TABLE III

AVERAGE NUMBER OF THE PATIENTS REFERRED ACCORDING TO THE DOCTORS' SPECIALITY

Speciality and working place		*Number of patients referred*
General practice:	GP	2.55
	SPGP	2.25
Child health services:	SPPED	3.5
	GPPED	4.3
School child health services:	SPSCH	2.3
	GPSCH	4.8
Occupational health services:	SPOH	2.4
	GPOH	3.1
Other specialists	(OSP)	1.8

A referral diagnosis clinically and etiologically differing from the discharge one was considered a *wrong* diagnosis; for instance morbilli instead of scarlatina, *hepatitis infectiosa* instead of *icterus ex obstructione*, acute meningo-encephalitis instead of typhus abdominalis.

A separate, relatively large group (110 diagnoses) consisted of such *symptomatic* diagnoses as *status febrilis*, *status febrilis e causa ignota*, *in observatione* etc. They may for the most part be considered *wrong* diagnoses. Among other diagnoses not *a priori* considered symptomatic, such as acute gastro-enteritis or acute tonsillopharyngitis, there may also quite certainly be found a number of symptomatic diagnoses relating to some *other* infectious diseases; yet they were not classified as symptomatic diagnoses but either as accurate, similar, or wrong—depending on how much they were in accord with the referral diagnosis. In this respect one should have in mind that the possibilities in making emergency diagnoses when sending patients to a fever hospital or in establishing the etiological diagnosis of infectious diseases in general, and of virus ones in particular, are far more limited than in other cases. In the studies carried out in Moscow symptomatic diagnoses were counted among wrong ones, only their percentage was expressed separately[2]. What also should be said is that in our seven patients with the sympto-

matic referral diagnosis, the discharge diagnosis, although based on thorough hospital examination, was also a symptomatic one, i.e. *febris e causa ignota*, while the diagnosis in 22 discharged patients from this group was febrile respiratory catarrh, acute naso-pharyngitis, which also means that the disease started and ended with symptoms characteristic of so many acute infectious diseases.

Part of referral and discharge diagnoses could be called 'multiple' because they actually consisted of several diagnoses, of which the first was considered the main diagnosis. There were 100 multiple referral diagnoses and 430 multiple discharge diagnoses. The ratio (1 : 4.3) is considered to be due to far wider possibilities of a more thorough hospital examination, both regarding time and clinical and laboratory facilities, in relation to what a non-hospital doctor, either because of the urgency of the case or the situation in the field, usually has at his disposal.

TABLE IV

AGE STRUCTURE OF THE PATIENTS REFERRED

Year of birth	*Age (years)*	*Number of patients*	*Percentage of the total number*	
–1966	Under 1	87	*8.4*	Children up to seven years
1964–1965	1–2	77	*7.5*	old: 351 (*33.9*)
1959–1963	3–7	187	*18.0*	
1952–1958	8–14	161	*15.5*	Primary school children: 161 (*15.5*)
1946–1951	15–20	101	*9.5*	
1936–1945	21–30	175	*16.8*	Persons 15–50 years old:
1926–1935	31–40	117	*11.2*	447 (*42.7*)
1916–1925	41–50	54	*5.2*	
1906–1915	51–60	38	*3.7*	Persons over 50 years old:
Before 1906	Over 60	43	*4.2*	81 (*7.9*)
TOTAL		1,040	*100.0*	

The age structure of the total number of the patients and the age groups of the patients in whom diagnostic errors were the most frequent are given in tables IV and V.

The comparatively highest number of errors is in the 51–60 age group, but the age groups differing numerically, the significance of figures also varies. Most wrong diagnoses in the aged relate to epidemic hepatitis which is the most frequent of all infectious diseases, and for this reason the relative possibility of error was also the greatest in this group. The percentage of errors was also

relatively high in small children, and the diagnoses where most mistakes were made were bronchopneumonia, bronchitis, *intoxicatio alimentaria*, tonsillopharyngitis.

TABLE V

RELATION BETWEEN REFERRAL AND DISCHARGE DIAGNOSES ACCORDING TO THE PATIENTS' AGE GROUPS

Year of birth of patients	*Age (year)*	*Number of diagnoses*					*"Errors"*	
		Accurate	*Similar*	*Wrong*	*Sympto-matic*	*Total*	*No.*	*Per cent*
1966	Under 1	39	18	15	15	87	30	*34.0*
1964–1965	1–2	55	9	7	6	77	13	*16.8*
1959–1963	3–7	128	15	27	17	187	44	*23.5*
1952–1958	8–14	111	7	23	20	161	43	*32.9*
1946–1951	15–20	74	9	8	10	101	18	*17.8*
1936–1945	21–30	100	28	20	27	175	47	*26.8*
1926–1935	31–40	68	25	17	7	117	24	*20.5*
1916–1925	41–50	28	11	9	6	54	15	*27.7*
1906–1915	51–60	15	10	11	2	38	13	*34.2*
Before 1906	Over 60	22	14	7	0	43	7	*16.2*
TOTAL		640	146	144	110	1,040	254	*24.4*

To avoid these errors in the future, it should always be remembered that in the aged the cause of their jaundice may lie somewhere else, not only in infectious hepatitis, and that in small children diarrhoea or acute inflammation of the respiratory tract may only be an accompanying symptom of some other diseases.

Table VI gives the absolute number and the percentage of the participation of individual groups of doctors, according to their specialities, in the total number of the errors made.

In considering the number and percentage of wrong diagnoses made by all the general practitioners, regardless of their working place, it can be seen that they made 96 wrong diagnoses (14.41 per cent) and 77 symptomatic diagnoses (11.5 per cent) in relation to 666 patients. All the specialists except those in hospital made 42 wrong

TABLE VI

NUMBER AND PERCENTAGE OF DOCTORS, ACCORDING TO THEIR SPECIALITY, IN RELATION TO THE TOTAL NUMBER OF THE DIAGNOSTIC ERRORS MADE

Speciality and working place	*Diagnoses*										*Total number of patients*	*Symptomatic and wrong diagnoses*	*Percentage of symptomatic and wrong diagnoses*
	Accurate		*Similar*		*Wrong*		*Symptomatic*						
	No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*					
General practice:													
GP	330	*60.5*	76	*13.9*	82	*15.0*	58	*10.6*			546	140	*25.6*
SPGP ..	60	*53.1*	24	*21.3*	16	*14.1*	13	*11.5*			113	29	*25.6*
Child health services:													
SPPED ..	75	*63.0*	20	*16.8*	16	*13.5*	8	*6.7*			119	24	*20.2*
GPPED ..	14	*46.7*	1	*3.3*	9	*30.0*	6	*20.0*			30	15	*50.0*
School child health services:													
SPSCH ..	34	*65.4*	4	*7.7*	4	*7.7*	10	*19.2*			52	14	*26.9*
GPSCH ..	28	*65.3*	6	*13.9*	2	*4.6*	7	*16.2*			43	9	*20.8*
Occupational health services:													
SPOH ..	17	*70.9*	2	*8.3*	4	*16.6*	1	*4.2*			24	5	*20.8*
GPOH ..	33	*70.3*	5	*10.6*	3	*6.4*	6	*12.7*			47	9	*19.1*
Other specialists	7	*77.8*	—		2	*22.2*	—				9	2	*22.2*
Hospitals ..	42	*73.8*	8	*14.0*	6	*10.5*	1	*1.7*			57	7	*12.2*
TOTAL ..	640	*61.5*	146	*14.0*	144	*13.9*	110	*10.6*			1,040	154	*24.5*

diagnoses and 32 symptomatic ones in relation to 317 patients, which means 13.24 per cent and 10.09 per cent respectively, of the patients referred by them.

Analysis of these results by the x^2-test has shown that there are no significant differences between the wrong diagnoses and the number of patients in individual groups, or between the kind of specialists in relation to the total number of wrong diagnoses and the total number of patients.

Out of 93 patients referred by the first aid (emergency) service, regardless of the doctors' speciality, 13 (13.9 per cent) diagnoses were wrong and 21 (22.5 per cent) symptomatic.

A relatively high percentage of symptomatic diagnoses made by the first aid service may be due to the impossibility of a more detailed

examination of their patients and no knowledge of the patients' socio-economic situation or the epidemiological situation in their environment, with which a family doctor is much more familiar and which allows him to make the diagnosis far more easily.

The 1,040 patients treated at the fever hospital were referred to it with 75 different diagnoses or symptomatic conditions; 66 of them with 25 different diagnoses usually considered internal, surgical, etc. Among these non-infective diseases referred to the hospital for infectious diseases, those relating to *gastritis hypacida*, polyarthritis rheumatica, cholelithiasis, and appendicitis, may be pointed out for illustration.

Agreement between referral and discharge diagnosis of *the most frequent* and *most important* diseases is shown in table VII.

From table VII it can be seen that relatively few errors were made

TABLE VII

AGREEMENT BETWEEN REFERRAL AND DISCHARGE DIAGNOSES OF MOST COMMON DISEASES

Disease	*Number of diagnoses*			*Number of patients*	*Percentage of wrong diagnoses*
	Accurate	*Similar*	*Wrong*		
Hepatitis epid.	297	2	39	338	*12.0*
Gastroenterocolitis ac. ..	88	62	4	154	*3.0*
Status febrilis; in obs.; .. Status febrilis e causa ignota				110	
Dysenteria bacil.	37	24	4	65	*6.1*
Meningitis epid.; meningismus; meningo-encephalitis ac.	19	6	26	51	*50.0*
Morbilli	25	2	3	30	*10.0*
Bronchopneumonia ..	20	3	4	27	*15.0*
Scarlatina	18	1	3	22	*14.0*
Parotitis epid.	17	3	—	20	*0.0*
Intoxicatio alimentar ..	2	9	9	20	*45.0*
Varicella	16	—	1	17	*6.0*
Gastroenterocolitis chron.	15	1	—	16	*0.0*
Amoebiasis	5	10	—	15	*0.0*
Angina lacunaris	6	2	7	15	*46.6*
Strongyloidosis	13	—	—	13	*0.0*
Pertussis	10	1	—	11	*0.0*
Erysipelas	5	1	3	9	*33.3*
Tonsillopharyngotracheitis ac.	2	1	6	9	*66.6*
Typhus abdominalis ..	1	—	6	7	*85.8*
Salmonellosis	5	1	1	7	*14.0*
Bronchitis ac.	2	1	3	6	*50.0*
Exanthema toxoalergicum	1	—	5	6	*83.3*
Tetanus	5	—	—	5	*0.0*

in diagnosing exanthematous infectious diseases in children, that no errors at all were made in diagnosing chronic infections or infestations, and that most errors related to the following diagnoses:

1. Infectious *mononucleosis.* It may be surprising that this disease is mentioned first, although it does not figure in table VII, but the point is just, in that no referral diagnosis of this disease was made at all—yet, there were six discharge diagnoses relating to this disease, which means that the percentage of errors was 100 per cent. We, non-hospital doctors very rarely think of this disease when making the differential diagnosis. These six patients were referred to the hospital with the following diagnoses: diphtheria, epidemic hepatitis, *tonsillitis pseudomembranacea, typhus abdominalis, status post scarlatinam, status febrilis* and *in observatione.* It may be said that the *pars pro toto* principle was applied in these cases: the non-hospital doctors were misled by the dominant symptom observed, without considering it part of another clinical entity.

2. *Typhus abdominalis.* This is, according to our experience, a disease that—unlike the previous one—is very often thought of, especially in prolonged febrile conditions for which no proper cause can be found. Out of seven patients referred with this diagnosis, only one actually had typhus abdominalis, while the remaining six patients suffered from: paratyphus—2, pneumonia—2, pulmonary tuberculosis—1, morbilli—1. It must be mentioned that among symptomatic referral diagnoses there were an additional five cases of subsequently proved abdominal typhus. Errors in referring patients to hospital with the diagnosis of typhus abdominalis occurred both to general practitioners and specialists, while one patient with a wrong diagnosis was sent from another hospital.

3. *Exanthema toxoallergicum.* Out of the patients referred to hospital with this diagnosis, only in one case was this confirmed—other cases related to: measles—2, rubella—1, acute gastroenterocolitis—1, herpetic gingivostomatitis—1.

4. *Acute tonsillopharyngitis and angina lacunaris.* In all, 24 patients were referred to hospital with these diagnoses; 54.1 per cent of them were relatively wrong. This high percentage of wrong diagnoses of this quite banal disease, encountered so often in everyday practice, may be surprising. The explanation may lie in the fact that these patients are sent to hospital only when seriously ill, i.e. when their disorders resemble, and often are, other infectious diseases in which the throat inflammation is a side symptom.

The correct diagnoses for tonsillopharyngitis were: measles—2, scarlatina—3, *typhus abdominalis*—1, agranulocytosis—2, meningococcal sepsis—2, otitis media—2, pneumonia—1.

5. *Meningitis, meningoencephalitis, meningismus.* These, too,

were diagnoses thought of much too often. In addition to the fear of responsibility, this may have been due to the symptomatology of the diagnoses that actually existed, such as headache, vomiting, somnolence. The discharge diagnoses were as follows: febrile respiratory catarrh—6, pneumonia—3, streptococcal sore-throat—3, acute pharyngitis—2, polyarthritis rheumatica acuta—2, influenza—2, sclerosis multiplex—1, *typhus abdominalis*—1, acute otitis media—1, bacillary dysentery—1, etc. It should be added that among the referral diagnoses classified as 'symptomatic' there were five cases of meningitis serosa and two cases of meningococcal sepsis.

6. *Status febrilis, status febrilis e causa ignota, in observatione.* Referral diagnoses of these diseases comprised over ten per cent of all patients. It would be tiresome to enumerate all discharge diagnoses behind these symptomatic referral diagnoses. It may suffice to say that among them there were 39 different discharge diagnoses, including morbus Brill, acetonemic vomiting, sinusitis paranasalis.

Discussion

This study, among its other objectives, aimed at evaluating the quality of work of doctors in non-hospital health services, and of general practitioners in particular. The literature dealing with the problem contains information on the evaluation of the general practitioners work as such, of the methods used, their validity and application, providing, however, very little information on the results of the use of these methods in practice[6]. Our analysis is an attempt to apply a method for the evaluation of general practitioner work in practice.

The general practitioner has far less chance of comparing his work with that of his colleagues, and is somehow left to find his own way[6].

This is the reason why as 'control groups' various specialists working in non-hospital health services were selected, as well as the hospitals which transfer their patients to the fever hospital.

Similar studies in other countries gave the following results: In the Netherlands the family doctor proved to make about ten per cent of wrong diagnoses in comparison with hospital doctors, assuming, of course, that the hospital diagnoses were 100 per cent correct. A similar percentage of errors was observed in policlinic doctors[3]. The study mostly related to internal diseases, where it is possible to make a series of preceding analyses and consultations, and for this reason the percentage of wrong diagnoses cannot be compared with the results of our study dealing mostly with infectious diseases.

A correct diagnosis is sometimes the result of routine, inspiration, or the knowledge of local conditions rather than the result of actual examination or objective findings. Some studies, for instance the Amsterdam study, concerning shortcomings in the examination on

the basis of which the patient is sent to hospital, have shown that inadequate initial examination according to the opinion of investigators existed in 50–60 per cent of patients[3].

The question arises whether a non-hospital doctor, and a general practitioner in particular, if he has time, should make a thorough clinical and laboratory examination of every patient, and whether he should only then send the patient to hospital, or whether his task ends at the moment when he establishes the need for hospital treatment, where in any case all other analyses will be made. A great many general practitioners in Yugoslavia and abroad are of the opinion that in practice the latter alternative may be applied, while hospital specialists consider it a fault in the general practitioner's work.

Conclusion

Comparison is made between referral and discharge diagnoses of 1,040 patients of the Fever Hospital in Zagreb. Agreement in diagnoses made by the general practitioners was as follows: the same or similar diagnoses amounted to 74.4 per cent, wrong diagnoses to 15 per cent, and symptomatic diagnoses to 10.6 per cent; in specialists in general medicine the percentage of wrong diagnoses was 14.1 per cent and of symptomatic diagnoses 11.5 per cent. There were no statistically significant differences between the results obtained by the general practitioners and those obtained by the specialists in general medicine or other specialists.

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