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Forum

Errors in Neurology*
History – Avoidance – Prevention

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Summary

The history and the present state of medical profession's attitude towards errors in medicine is analyzed in the critical study. The excellent Boston practicing physician R. Cabot aroused this problem some hundred years ago in two papers comparing diagnoses of patients admitted to hospital with post mortem findings at autopsy. More recently the interest for medical errors has been renewed by the Institute of Medicine (IOM, Washington, 1999). The author analyzed some of the papers on different aspects of mostly nonfatal errors in neurology, which made evident that this type of investigations is important, improving continually medical diagnostics, making possible optimal choice of treatment on time.

The author concludes that the academic medicine should make coordinating efforts to study different kinds of possible medical errors, arising under special and different circumstances, which should exclude unnecessary litigation processes. The young doctors should learn the methodology how to avoid and prevent medical errors, like studying differential diagnostics of diseases. The states' institutions or medical organizations on international level should produce basic legal rules for this area, and be responsible for these processes, like it is in the aviation, street traffic or see accidents.

The medical doctors must have certain degree of protection, aware at the same time that they are participated in a mission service to protect human individual life and humanity at whole: studying possible medical errors is important improving continually medical science and practice in local and global perspectives.

INTRODUCTION

Until approximately 100 years ago there were no endeavors to investigate errors in medicine. At the beginnings of modern medicine it was introduced to give a diagnosis causing death for patients deceased in hospital. Before modern medicine has been developed, for persons reached 60 years or more, deceased at home, having no other evidence for cause of death, a coroner usually wrote as a "diagnosis": "decrepit", "worn-out".

As the modern medicine was reaching higher levels, the diagnosis of the sick or deceased person, particularly a hospitalized one, attained greater interest. Richard Cabot, a practicing physician in the Harvard hospital system, has been widely known as the first doctor publishing a paper on errors in medicine, in 1910: "A Study of Mistaken Diagnosis

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Based on the Analysis of 1,000 Autopsies and a Comparison with the Clinical Findings" *(1).* In 1912 he published a similar study: "Diagnostic pitfalls identified during a study of three thousand autopsies" *(2).* In these papers he examined rates of errors in medical diagnoses. Cabot's articles were evaluated by some as harmful and dangerous, and his assertions of medical errors occurring in prestigious Massachusetts General Hospital disturbed many practicing physicians in New England. Gore and Gregory *(3)* in their historical analysis conclude on Cabot's reports: "His report recounted his personal review of 1,000 clinical records of patients who had recently died in the Massachusetts General Hospital. For each patient, he compared the clinical diagnosis, which he obtained on review of the medical records, with the postmortem findings, evident at autopsy. Any disparity between the clinical diagnosis and the autopsy findings was categorized as a diagnostic error. Cabot found significant errors in the pre-mortem diagnoses, especially in such areas as cardiovascular disease and acute nephritis. - He did not conclude with a condemnation of physicians or their motivation, but, instead, considered his report compelling evidence that the medical profession of these days held a multitude of false assumptions that flawed the diagnostic acumen of physicians. - In the second article he described grave systemic errors in the practice of medicine. He was, however, careful to point out that such errors were not the result of incompetence of individual doctors, stating that he did not believe that the figures depended to any considerable degree on lack of virtuosity in diagnosis, concluding: "The methods of diagnosis, not the men who used them, had to be flawed. - Reform, not blame", was Cabot's message. However, reaction of most contemporary physicians was rejection of Cabot's idea of inherent dysfunctions in the medical system, deflecting Cabot's findings to "Boston doctors". The Massachusetts Medical Society considered expelling Cabot for "publicly advertising the faults of the general practitioner." Cabot ultimately retained his membership in the society, probably because of his reputation of a superb physician.

The system of malpractice litigations in the USA and, to a lesser degree, in some other industrial countries, did not bring new methods of auto-analysis of medical practice, although it indirectly brought some protection in the system of internal coordination in big hospitals, especially between clinical and laboratory divisions.

Something less than 100 years after the Cabot's analyses of medical errors, in November 1999, a report from the *Institute of Medicine* (IOM), Washington DC (USA) „To Err Is Human" *(4),* stated that errors made by the medical profession are the *eighth leading cause of death* in the United States. The report provoked a nationwide reaction to improve the patients' safety. The Institute, composed largely of health care administrators, recommended mandatory reporting of adverse events, heightened standards and expansion of safety systems within health care organizations. The IOM report estimated that *between 44,000 and 98,000 deaths occur annually in American hospitals* as a result of medical error. The stated goal of the report was to show that a health system, despite being well-intentioned, produced significant errors: **such errors should and could be combated** by addressing weak spots within the system. – However, many physicians condemned the report. The true incidence of error-related mortality was disputed and all challenges to the IOM emphasized the competency and dignity of medical profession *(3).*

Reaction to the IOM report was violent, like in the Cabot's time. One critique *(5)* questioned, correctly, whether patients would not have died if adverse events had been avoided. Unlike aviation safety, where collisions directly lead to death, analysis of adverse medical events is much more complex. Death from some disease is finally inevitable. Hayward and Hofer *(6)* reviewed 111 hospital deaths at several Veterans hospitals. Their work initially suggested that ¼ of the hospital deaths was possibly preventable; on further consideration of prognosis they estimated that fewer than 1 % of the patients who died would have lived more than 3 months in good health if the errors had not occurred. Although these papers suggested a more modest magnitude of medical errors, **retrospective reviews** display differences in the population of patients reviewed and reflect the bias of the reviewers *(3).* Brennan *(7)* agreed that physicians had long been too complacent about iatrogenic injury, but he argued that the word ***„error"*** is too strong to convay the phenomena analyzed by the IOM, having a „pejorative overtones, that the press has amplified". He expressed concern that the connotation of error, combined with the magnitude of the estimated deaths, would incite a surge of malpractice litigations. The fear of litigation, he argued, would inhibit physicians from working openly toward reducing errors. Few physicians or institutions would willingly admit mistakes, especially when such confessions could lead to litigation and financial loss. To address this **problem of self-incrimination**, a mechanism should be adopted to allow practitioners to disclose, with candor, the causes and consequences of medical injury, without the threat of financial ruin or restraint of employment.

„Although the science and technology of medicine have made remarkable progress since Cabot's time, the fears and apprehensions of physicians in response to his work were remarkably similar to those recently expressed by many members of our profession. Such anxieties are, as they were then, a major impediment to improvement in health care" *(3).*

DEFINITIONS OF ERRORS IN MEDICINE

Vehement discussions in the USA indicated that term **„medical error"** has manifold complex significances: some of them certainly have a *pejorative meaning*. The

term ***„malpractice"*** was accepted in the litigation processes, where it had to be proven that a doctor or medical institution committed an error, which had as a consequence a serious damage or death of a patient, first used by lawyers and thereafter by medical profession. The discussion, which followed after the IOM report, brought some excellent opinions and good proposals to start studying errors in medicine and their possible elimination.

Graber at al. *(8)* proposed a better definition of medical errors, for the purpose of the possibility of their elimination, or at least diminution. They analyze **Diagnostic errors**, dividing them into:

„No-fault errors" – cases where the illness is silent, masked or presents in an atypical fashion hampering the correct diagnosis with the current state of medical knowledge, or in the conditions misdiagnosed because the patient has not presented his or her symptoms clearly.

„System errors" – reflect latent flaws in the health care system: in this category are *weak policies*, *poor coordination of care*, *inadequate training or supervision*, *defective communication*, *system factors that detract from optimal working conditions,* such as *stress, fatigue, distractions, and excessive workload*.

„Cognitive errors" appear if the problem is *inadequately known,* if *faulty data are gathered*, because of *inaccurate clinical reasoning* or of *faulty verification*.

Medication errors may be the consequence of „system errors" or of „cognitive errors".

The errors in medical care have two distinct roots: At the ***„sharp end"*** is the individual health *provider (doctor, nurse),* which interacts with the patient and makes a mistake. At the ***„blunt end"*** (*persons in the system controlling resources – administrators*) are the latent flaws in the health care system that provides the *setting* and the *framework*, the predisposition for the error to occur. „Blunt-end" factors include the system's organization structure, culture, policies, procedures, provided resources, ground rules for communication and interaction.

The **inevitability of error**, not only in medicine, but also in any other sphere of human activity, has often been pointed out. However, ***medicine is different from almost any other human activity:*** errors in medicine can lead to tragic consequences for the patient; doctors should make every effort to use prudent judgment and intelligence in making their medical decisions.

In **research,** opposed to **clinical medicine,** error may be a fundamental ingredient. Lewis Thomas *(9)* wrote: „In research, the usefulness of error is that it leads to more research, and this is what the word tells us. To *err* doesn't really mean getting things wrong; its etymology derives from the Indo-European root *ers,* signifying „to be in motion": Latin *errare* = „to wander", the same root emerges in Old Norse as „*ras",* rushing about, looking for something, from which comes the English word „race". In order to get anything right, we are obliged first to get a great many things wrong".

We would propose for possible **errors in medicine** the following simple scheme:

- ***Scientific mistakes (delusions, fallacies, misconceptions)***
- ***Diagnostic errors***
- ***Medication errors***
- ***Medical malpractice*** *(lat.: vitium artis)*

ERRORS IN NEUROLOGY

The general problem of errors in medicine can be easily illustrated in the discipline of neurology, having specific place in medicine in questions of diagnostics: alongside with the *etiological diagnosis* – fundamental in all medical disciplines, usually nearly most critical part of neurological diagnosis, is *topical diagnosis = localization of lesion* – it may be *clinically mute (without evident manifestations)*, or *eloquent,* with neurological or psychological symptoms a) of deficiency or b) symptoms of increased or c) abnormal activity: sensory, motor or mental. Neurological diagnosis may be sometimes made relatively easily on the basis of illness history and meticulous neurological examination, nowadays also confirmed, proved or explained with modern technologically sophisticated methods: functional or imaging.

For a long time regarded as an intricate discipline with many diagnostic perplexities, more liable to diagnostic errors among medical disciplines, particularly in times based on „illness history, hammer and needle", did not enable the diagnosis early enough to start management as early as possible. Recent fast development of new technologies, applied appropriately, opened possibilities earlier and more accurate diagnosis, enabling early and efficient therapy. However, new dangers of errors may happen using even these advanced techniques. As science and practical medical discipline, with complex, sometimes still partly understood relations between brain and mind, with not always known relations between nervous, especially cerebral structures, with insufficient knowledge of responsible etiologic and pathogenic factors, errors may still appear. In some periods during evolution of our civilization philosophy and religion strongly influenced scientific developments of neurological thought. For all those reasons neurology was more prone to errors than other medical disciplines. Clinical manifestations with dominant psychological symptoms have been not recognized as consequence of organic structural or functional changes in the brain: many purely neurological diseases were regarded and treated as psychological or psychiatric disorders: epilepsies, tumors, dementias, cognitive difficulties, changes of personality, headaches, vertigo, loss of

consciousness, etc. Clinical knowledge of new localizing syndromes, recognized by clinicians still at the end of 19th and in the 20th century (Anton's, Gerstmann's, and many other), knowledge on aphasias and disturbances of higher mental functions, are prerequisite for a timely diagnosis of patients with lesions in cortical regions, without an „eloquent" cerebral lesion. Advances in basic sciences and new diagnostic technologies and changed basic concepts of neurological diseases, resulting in changes in neurological manpower and institutions in developed countries; in less developed regions and in different circumstances the possibilities of diagnostics and avoiding diagnostic errors must be therefore appropriately evaluated with other criteria.

Even good clinicians with a broad theoretical education and good clinical experience in the times „of hammer and needle" often used, as a protection against wrong diagnosis, an appendix „in observation". Some diagnostic errors or inaccuracies could be disclosed only later, when the first diagnosis had been already fast forgotten: so many patients with cerebral tumors of slow progression or of benign character, finished in psychiatric institutions, with true diagnosis only at autopsy. Relatively frequent misdiagnoses „multiple sclerosis" may be mentioned, e.g., expansions in the medullar channel or Arnold-Chiari malformation. In German literature, there was a proverb: „a neurological department with a lot of *„multiple sclerosis"* cases is a department with poor diagnostics". In those times there were no big social consequences for such errors. It seems that both medical profession and community felt apathetical, accepting helplessly such situations. Good textbooks had an ample amount of **differential diagnoses** giving opportunities to avoid false diagnoses. Relatively few warnings against the diagnostic or therapeutic errors were present in literature of that time. Because of a fear of a possible error, what was always possible, like in other medical disciplines, individual critiques were not usual, regarded as *unloyal* and *unacceptable*.

Famous mistakes of great neurologists

The history of neurology proves that at least some of these thoughts are true. We should be aware of errors – famous „conceptual" mistakes committed by great neurologists, founders of modern neurology, in times when the human thought had been trying to create basic concepts of neurology. These errors should be best understood as *scientific mistakes* or *misconceptions:* they were the specificities of early neurologists, but they may be repeated in our days, and will be, certainly, also in the future. In line with what we have analyzed in the introduction, we wanted to show how great pioneers in neurology, who left permanent traces in the concepts of scientific and practical neurology, also made famous errors in their conceptual hypotheses of basic functions of brain and nervous system.

Modern history of the evolution of „behavioral neurology" and „neuropsychology" starts with the Gall's and Spurzheim's book *(10)* on functions of the brain's parts for individual mental attributes, published in several editions in France, England and USA. The Gall's theory rose from his belief that „the form of the head and cranium represents, in most cases, the form of the brain". **Franz Joseph Gall** (1758-1828) was the first famous representative of ***cerebral localization theories***, trying to associate human faculties to particular brain centers, presuming that such brain „centers" produce specific shape of the skull in every individual. He studied skulls of people with particular traits, good or bad, and even of animals, and made an arbitrary map of brain centers for 27 „basic human faculties" with corresponding parts of the skull. Gall propagated the idea, that the observation of naturally existing phenomena was the cardinal method for gaining information. He was a practical doctor in Vienna: after having taught his new theory on localization of human mental abilities, he was banned from Austria by the Emperor Francis I in 1802, for „spreading materialistic ideas opposed to morality and religion". So Gall had to pay very expensive price for his studies of human mental activities. He settled in Paris, visiting European centers, studying anatomic problems of that time (eg. proving the *decussation of the pyramids*). His localization theory was later named „phrenology". His doctrine was that the brain was the instrument of the mind, possessing a number of „organs", centers concerned with specific innate „faculties" *(11).* Later on, after new discoveries on localized functions of the brain, this theory was for a log time regarded as a ridiculous mistake of „unscientific" neurology. It is less known, that Gall also surmised that the man's speech abilities should be ascribed to the frontal region, what later inspired **Paul Broca** (1824-1880), a great supporter of Gall and „localizationists" of his time, who were observing patients with right hemiplegia and speech difficulties. Broca reported in 1861 speech organization in human brain, proving in clinical case that speech faculties are localized in the frontal region in his modern scientifically based description of ***aphemia (motor aphasia)*** *(12).* Only after critical reappraisals Gall has been recognized in his deserved position in the history of neurology. Great anatomist recognized in his time, he had to go through humiliations, exile, oppositions, denials and mockeries – as a pioneer of the brain localization theory, until he was only later recognized a founder of brain localization.

Jean Pierre Flourens (1784-1867), was the most violent opponent of Gall: he is nowadays regarded as father of ***experimental physiology***. He insisted that only carefully designed experiment can provide adequate method corroborating clinical observation. He used surgical removal of particular parts of the brain, with subsequent study of its effect on animal's behavior. He concluded that animals with lesions of the hemispheres showed defects

in intelligence, alertness, memory, reasoning, desire and even dreaming. Flourens' opposition to Gall's views on the mind-brain relations was at least partly *motivated by religious considerations*, being based on the *church's standpoints that* ***the soul is unitary***. Carrying extensive experiments of brain lesions in animals, in order to demonstrate the ***equipotentiality of various brain parts***, being so the most important representative of the ***„holistic" (unitary) brain theory***, opposed to the ***„localizationist viewpoint"*** *(12, 13),* he himself contradicted his most important innovation – experimental neurophysiology, due to simple experimental conditions, also sustained by his prejudice.

John Hughlings Jackson (1835-1911) was certainly the strongest personality in the history of neurology. Although frequently named the „father of English neurology", his contributions belong to the foundations of modern neurology: therefore he is the ***„father of modern neurology".*** It is hardly imaginable that in his lifetime he made such important innovations in various parts of neurology, creating its new concept, on which all later research contributed only parts to his basic model. Born as the youngest of five children in a village 10 miles from York (England), in a family of a prosperous brewer and farmer, ended his formal education at the age of 15 and became an apprentice to a prosperous physician in York *(11, 14).* In 1856 he became a member of the Royal College of Surgeons and a licentiate of the Royal College of Physicians. In his 27 he was appointed Assistant Physician at the „Hospital for the Paralysed and Epileptic" (now: „National Hospital, Queen Square", London), founded two years before by E. Brown-Séquard, pioneering neurophysiologist of his time. In 1865 he married Elisabeth, who died 11 years later of an illness characterized by partial seizures, consequence of septic cerebral thrombophlebitis complicating pregnancy. Shattered by the loss of his beloved wife he remained alone for the rest of life. Observing many patients with epilepsy, he concluded (in 1867) that epilepsy occurs when „the ill-nourished nerve-tissue has become unstable, over-ready, „excitable" *(15).* In 1869, Jackson contrasted the depletion of nervous force in hemiplegia with the disorderly discharge of stored force in unilateral convulsion *(16).* In 1873 he left as his legacy to our times a famous dictum on the nature of the epileptic discharge: „**Epilepsy** is the name for occasional, sudden, excessive, rapid, and local discharge of gray matter" *(17).* He expressed important statement, later more than forgotten: *„A convulsion is but a symptom*, and implies only that there is an occasional, an excessive, and a disorderly discharge of nerve tissue on muscles". He strongly disagreed with the then conventional belief that the cortex was inexcitable, seizures originating in subcortical gray matter, asserting that seizures depend on instability of gray matter, either in the cortex or in the subcortex (striatum). Studying partial epilepsies, he concluded that there are „**weighted somatotopic representations**" in the brain: „points where particular movements are specially represented" *(18).* He wrote about the relations between the cerebral cortex and the basal ganglia, taught on necessity to distinguish differences between speech, articulation and voice, between intellectual and emotional speech, studied associations between aphasia and hemiplegia, described hemianopia.

His most important contributions to neurological science were his application of the Darwinian evolutionism and German „Naturphilosophie" to the „evolutionary neurophysiology", explaining differences in functioning of the nervous system in different species by evolution and the achieved ***hierarchy of functions***, with the most complex ones in the phylogenetically youngest evolutionary centers – in humans. Jackson expressed his belief, that in the diseased nervous system there is a *„process reverse to evolution",* which he named *„**dissolution**".* Patients with a „dissolution of the nervous system" exhibit symptoms, which are less complex, less specialized and less voluntary than in normal subjects. Patients with diseases of the highest centers develop two types of symptoms, *negative symptoms* due to the loss of higher centers and *positive symptoms* due to the emergence (activation) of lower centers. Positive symptoms are functionally simpler, less differentiated than negative symptoms appearing in the absence of control after a lesion of the higher centers. Jackson's durable contribution to neurology is the *application of evolutionary neurophysiology*, which he created from his bedside observations *(14, 19, 20).*

Jackson allocated ***consciousness*** **in the highest, evolutionary the youngest part of brain: the pre-motor frontal cortex**. This ***famous Jackson's error*** is logical for his knowledge of the complex organization of mental functions: in the latter he was fully right. Jackson described „postictal mental symptoms having two components predicted by evolutionary theory: the *negative symptom of postictal confusion* (from the temporary paralysis of higher centers), and the *positive symptoms of postictal mania or agitation* (from the emergence of the function of the previously inhibited lower centers) *(20, 21).* The modern concept of **ARAS (ascending reticular activating system)** will appear in the second half of the 20th century after discoveries by Bremer, Moruzzi, Magoun and their collaborators and followers, with new technological possibilities. However, the **functions of prefrontal cortex in the control of behavior** were brilliantly anticipated as an excellent example of **logical thinking in Jackson's concept of neurology**.

Errors in neurology of our times

In order to get information on the present writings on the errors in neurology we have used the Ovid Medline Search from 1966 to 2004 (February) on the following items: *Diagnostic errors* (55847), *Medical errors, Malpractice, Medication errors* (61533), **Nervous system diseases**

(934973). With the limits „human" and „yrs 2000-2004" we got 200 citations which should cover the items of interest in these years' period. Analyzed data show the increasing interest for errors in medicine, and so in neurology: it should be regarded an important supplement to the classical methods of analyses and teaching in medicine, and so in neurology. Some papers are, however, too vague, only general observations or contemplations, which may be regarded only as an incentive for a certain milieu. We shall report some instructing papers, having broader interest from methodological point of view.

Authors of the paper **„Initial misdiagnosis and outcome after subarachnoid hemorrhage"** *(22),* from New York (USA), send a warning message, that mortality can be reduced only if the SAH is treated urgently. In this study a misdiagnosis of SAH occurred in 12% of patients, being associated with a smaller hemorrhage and normal mental status. **The authors recommend a CT scanning** in patients with mild symptoms, what can reduce the frequency of misdiagnosis.

Forty percent of patients with aneurismal SAH *(23),* reported the authors from Linkoping (Sweden), had **prodromal warning episodes of sudden headache;** due to difficulties in identifying these events, initial diagnostic error was registered in 12% of these patients,. Modifications of diagnostic and referral patterns through education of local doctors may help to identify such patients before a major devastating rupture occurs. Diagnostic errors were reduced by 77% as a result of continuous interaction between neurosurgeons and local physicians. **Misdiagnososis of warning episodes** cause greater loss of lives in a population than do delayed ischemic complications from vasospasm in aneurismal SAH. Teaching programs at low cost, focused on local physicians, had a profound impact on the outcome.

The Israeli author examines the concept of „**Chronic fatigue syndrome – medical fact or artifact"** *(24).* Despite of extensive investigation, the enigma of CFS continues to confound medical researchers. Although fatigue is central to CFS, medical scientists appear not to understand what fatigue really is nor what is its mode of function. Physicians and other researchers fail to observe the fundamental procedure of clinical medicine: correct examination of patients before making diagnosis providing treatment. The author introduces a notion of the **„black hole" of medicine**.

The author from Los Angeles reports on the **„Misdiagnosis of spontaneous intracranial hypotension"** *(25).* It is an important cause of new „daily persistent headaches". The clinical course in 18 consecutive patients with spontaneous intracranial hypotension was evaluated for definitive surgical treatment of the underlying spontaneous spinal cerebrospinal fluid leak from January 1, 2001, through June 30, 2002. Seventeen patients (94%) had initially received an incorrect diagnosis, the diagnostic delay ranging on an average 5 weeks. Common wrong diagnoses were: migraine, meningitis, psychogenic disorder. Patients with spontaneous intracranial hypotension are commonly misdiagnosed with a significant delay in the initiation of effective treatments and exposing patients to the risks associated with the treatment for the presumed, wrong illness. **Increasing awareness of this spontaneous type of intracranial hypotension is required**.

Jerusalem authors evaluated the **„Patterns of misdiagnosis of multiple sclerosis"**. *(26)* The variability in the clinical presentation of MS may result in misdiagnoses. Twentynine patients (58%) were initially given 41 wrong diagnoses. While the majority of women were misdiagnosed mentally ill, orthopedic work-up was offered to the men. Misdiagnosis of MS occurred most often in patients who presented non-specific sensory symptoms that did not conform to any specific neurological syndrome. The difference in type of misdiagnosis between men and women may reflect a gender-dependent bias how physicians interpret sensory complaints.

The UK authors (pediatricians and neurologists) discussed frequent **misdiagnoses of epilepsies in pediatric population** *(27).* A doctor, consultant pediatrician, was suspended, because from 214 children seen by him, 171 of them the control gave a *definite* or *possible „cause for concern"*. An adequate diagnosis requires differentiation between seizures and other causes of transient neurological disturbances or collapse. In another doctor, from 184 consecutive patients referred to consultant neurologist, 46 were misdiagnosed. The final assessment criticized **a poor quality of epilepsy services in the UK**; it is derisory that there were only 62 pediatric neurologists in the UK! At least 15 years is needed to educate sufficient number of specialists. In the meantime the only possibility is better training of pediatricians.

Authors from the Department of Public Health and Primary Health care (Bergen, Norway) report on the **„Missing diagnosis: Senile dementia in patients admitted to nursing homes"** *(28).* They investigated diagnoses of „dementia" established in patients recently admitted to a nursing home by a geriatrician and compared the agreement with diagnoses recorded in the nursing home's medical records. This may have serious consequences for the treatment. Diagnostics of „dementia" in primary health care must be improved.

Authors from Tromso (Norway) studied the frequency of **„Drug-associated headache unrecognized in patients treated at a neurological centre**" *(29).* They studied the frequency of unrecognized headache associated with overuse of analgesic drugs in a population of patients with headache treated at a neurological center. Specific diagnoses given by the neurologist were reported in 134 of the patients (51%). Only two patients reported that they suffered from a possible drug-associated headache. This study shows that drug overuse may be the cause of

chronic headache in more than ¼ patients referred to neurologists. Drug-associated headache is a difficult diagnosis, which deserves more attention, because it is a common and treatable condition.

A paper investigating **„Misdiagnosis of cluster headache"** coming from Iowa City (USA) accentuates a common clinical practice leading significantly to wrong morbidity *(30).* The International Headache Society published diagnostic criteria that are generally straightforward and useful: necessary is careful understanding of these criteria and teaching how to handle the other patients. The **primary diagnostic points** involve severity, length, and frequency of individual headache attacks, as well as the presence of ipsilateral autonomic features. Additional features as time cycling of headache clusters, physical characteristics of patients, the response to treatment, may prove useful in individual cases, but must not be relied on too much.

Neurologists from Miami (Florida, USA) report on the study „**Delayed diagnosis of cluster headache in African-American women"** *(31).* The male-to-female ratio in cluster headache over the last several decades has fallen to 2.1:1. Unfortunately, women still are not diagnosed accurately. This lack of appropriate diagnosis appears related to the misconception that cluster headache rarely occurs in women. They reported cluster headache in five African-American women, in whom the diagnosis was delayed due to gender, ethnicity, and, most importantly, to inability to make a correct diagnosis of cluster headache. Cluster headache diagnostic criteria are not different in men and women and have no ethnic boundaries. Migrainous features occur commonly in cluster headache, when present, should not exclude the diagnosis. The diagnosis of cluster headache is easily made on the ground of unilateral orbital, supraorbital or temporal location of pain of short duration (untreated: 15-180 minutes), and ipsilateral autonomic dysfunction involving the eye or nose.

Neurologists from Tilburg (The Netherlands) report on their investigations of the **clinical features of spinal dural arteriovenous fistulas** *(32).* The aim of the study was to describe the clinical spectrum of spinal dural arteriovenous fistulas (SDAF) in a large group of patients. They studied the records of 80 patients who were diagnosed with an SDAF in six hospitals over 15 years-period (1985-2001). Most patients were middle aged men, and most SDAF were located in the mid-thoracic region. The median time to diagnosis of 80 patients with an SDAF was 15 months (range 7 days-197 months). The most common initial symptoms were gait disturbances (34%), numbness (24%), and paresthesias (21%). At the time of diagnosis, most common symptoms were micturition problems (80%), leg weakness (78%), and numbness in the legs or buttocks (69%). The combination of all three symptoms was present in 58% of patients. Some symptoms or signs related to sacral segments had developed in 67 patients (84%). Fifteen patients (19%) became wheelchair bound. – SDAF is difficult to diagnose, and the delay between the first symptoms and the treatment is often long. In middle-aged men with disturbances of gait with ascending motor and sensory deficits, who subsequently report impaired voiding or other sphincter disturbance, SDAF is one of the first diagnoses that should cross the mind.

Many of the papers devoted to the errors in neurology discuss problems of **pediatric neurology**, clinical negligence litigation cases connected with **cerebral palsy**, **surgical litigation cases** with neurological lesions, claims related to **chronic pain** management, **neuroradiological diagnostics** by CT or MRI, **medico-legal problems of care in neurology** involving doctors, nurses and the institutions, **problems appearing in emergency patients**, etc. Some papers are dealing with some **specific, relatively rare diseases**, like progressive supranuclear palsy, corticobasal degeneration, cerebral malaria, topics that can be found in search for a specific problem, and may be useful for colleagues interested in these fields.

DISCUSSION AND CONCLUSIONS

The appearance of a „new" topic: **errors in medicine**, (so also in neurology), opened to investigations analyses of errors appearing in diagnostics or management. For various reasons it has been found an important part of clinical medicine. In the analyzed papers greatest concern was directed to *better differential diagnosis* in some more recent concepts in neurology, avoiding errors and enabling better diagnostics, improving in that way necessary therapy.

At the same time, specially in non-professional media, „patients' safety" and „errors in medicine" have been gaining increasing interest in the public, unhappily in the last century also for growing financial gain, for recuperation of the potentially damaged patient or his family. It is true, that this has been too long neglected and not appropriately solved. The notion of „wrong diagnosis" has been probably promoted in our times due to the increasing medico-legal problems in financial litigation processes, first in the USA and then in some European countries. Unhappily, the „litigation processes" started to be a real „industry gaining money" from health institutions.

The early and recent analyses also show the intrinsic moral and ethical need of the best representatives of our discipline. The famous „Cabot case" clearly indicated such a need. Subsequent discussions have shown division of our profession into those supporting this type of research and those who feel that it is necessary to protect our profession and medical institutions against possible flood of litigation cases, not only for financial reasons, but also for dignity of medical profession in the community. Both standpoints should be regarded legal, and we should never

forget the old dictum of Hippocrates: „First do not harm", in line with the best traditions of physicians having mission of fierce ethic professional and personal responsibility, with their conscientiousness as key attribute of good medical doctor.

The developments in medicine are result of better understanding the basis of diseases. The inventors of new concepts have found an explanation of previous misconceptions. Advances in neurology and new techniques have greatly improved possibilities of correct and timely neurological diagnostics and new management, surgical or medical, demanding fast conclusions in critical situations and decisive determination. Interest for medical errors in academic medicine belongs to the same fundaments of medicine by medical research. The old Roman dictum „Errando discimus" (we learn through mistakes) does not mean that everyone has to learn on his own errors: **errors should be regarded as a common human heritage:** the level of culture and civilization of one nation or one individual reflects in fact ***how*** and ***what*** *was learned* ***from one's own and other people's errors in the past.*** It is everyone's experience that it is less traumatic to learn from the other people's mistakes, than from one's own.

Meyer, Lewin and Eisenberg analysed **roots of human error in medicine**. They indicated to the **„chain of evolution of events"** *(33),* present in the development and in the arising of some errors: it is necessary to study all the elements of such chains. Mistakes can be recognized as such only in the context of a **specific, dynamic, complicated** situation. *Studying this chain of evolution, it is possible to come to the* ***primary element in this chain:*** *– knowing the problem and teaching about it,* ***probably*** *is* ***one of new obligations of academic medicin****e (34),* and it should be accepted together with already traditional academic teaching subjects, such as are nowadays the ***differential diagnoses***.New sophisticated techniques give also new possibilities for errors: the doctor contacting a patient gets a lot of *written partial opinions*: imaging or functional diagnostic techniques, biochemical findings, opinions of other specialists, etc. Each of those findings may lead to the wrong conclusions which the doctor at the „sharp end", giving his opinion to the patient or his family, can lead to possible wrong diagnosis. Very sophisticated techniques (e.g. CT, MRI) depend on ***high grade of technical construction and infallible functioning***. This information should be included in the report, giving to the responsible doctor idea on reliability of the instrument used. **The medical teams should not agree to work with unreliable machines.**

In the former times there was a good clinical tradition to have „consilium = consultation" of several specialists of the same or different specialties in patients difficult to diagnose, and the findings, were discussed by several specialists. This policy should be a part of the „system" and a „chain" should be adapted to individual or local specific needs.

Individual error must be differentiated from ***weak sides of the system:*** Individual competency and experience must be differentiated from the competency of the chain of the system, for which must be responsible the head of the team, on one side – the administration organizing the whole health system in the country, region, in community – on the other side.

There should be international consensus how to diagnose an error, the patient or his family should be compensated without much and long processes: the origin and responsibility of error should be identified later.

Avoiding and preventing errors should be a special discipline in order to make the „errors" quite exceptional, although, unhappily, a permanent weak point of human life. We must agree that some errors in medicine will be inevitable, but happening as an exception. To achieve this, we must analyze where *may arise a weak point in tht whole „chain" of developments* leading to possibly heavy or fatal error. The group of responsible doctors and the whole staff, must analyze and openly discuss the sequence of steps which ended unfavorably. For this we need a long, hard and difficult route, but also a good cooperation of all participants, without restraint and without fear of individual, institutional and social consequences. In this process must be differentiated the malpractice (vitium artis) from the lack of necessary standard norms of profession, pure negligence from factors due to the institutional rules, which make scientifically based professional decision difficult or impossible. The mentioned steps against medical errors should be one of the next responsible tasks not only of our medical profession worldwide, but of the whole humanity.

Finally we must learn to differentiate medical errors made in inadequate situations with restricted diagnostic and therapeutic possibilities, those in developed countries with a lot of subspecialized medical doctors and well educated, experienced and skilful personnel from those countries and regions, where there is insufficiently educated personnel and inadequate technical possibilities.

Academic medicine should make coordinating efforts to study different kinds of errors, possibly arising under special circumstances, excluding unnecessary litigation processes, in order to learn, in new, like in the old circumstances, young doctors the methodology how to avoid and prevent the errors, making them rare exceptions. The states, on the international level, must be responsible for these processes, like it is for the aviation, street traffic or see accidents.

The doctor must be aware, that he is responsible only if he has not done everything according to the laws of art in medical science and to his medical education, when caring on his patient's health and his life.

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