Software guide suggestion to assist clinical medical diagnosis in human trichinellosis in primary care

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Abstract: The paper is a possible methodological guide for computer assistance of the clinical medical diagnosis. It starts from the idea to offer information necessary for soft designers to create a software package operating and processing information, helping the medical and clinical diagnosis. The program should be able to sort, select and compare the information with the medical data base, keeping only suggestive information used to elaborate a software assisting procedure sustaining the medical diagnosis elaboration. Human trichinellosis is a widely spread in the world and caused by species of Trichinella parasite. The polymorphic clinical manifestation can reach different levels of development. Positive diagnosis and treatment beginning should be done as soon as possible to prevent a severe or sequel evolution. These are some reasons why the medical software should be designed to assure the expected results (diagnosis production, reproducibility of diagnosis for similar information), to be flexible, easy to understand, access and operate, to accept reviews, changes and completion. The present paper suggests the possibility to create a widely applicable software to assist the medical diagnosis not only in human trichinellosis but in any other situation when applicable in general practice enabling a rapid orientation to correct diagnosis and to guide the patient to specialized medical services.

Key Words: clinical medical diagnosis, computer assistance, trichinellosis

Argumentation

Human trichinellosis is widely spread in the world and caused by species of Trichinella parasite. The polymorphic clinical manifestation can reach different levels of development: non symptomatic (detected only with specific laboratory investigations), light symptoms (low clinical manifestations, sometimes non characteristic), medium symptoms (suggestive clinical symptoms, very well expressed and might have a potential severe evolution) and severe (with multiple cardiovascular, neurological, respiratory, allergic complications, being potentially dangerous for patient's life). Even after healing sequels could persist, chronic tiredness with chronic muscles pain and fatigability are the most frequent. Positive diagnosis and treatment beginning should be done as soon as possible to prevent a severe or sequel evolution.

The differential diagnosis should exclude a lot of illnesses with common clinical manifestations, associating the epidemiological information with clinical elements and specific laboratory results or other investigations. The pig represents the main source of contamination; rarely the source could be the horse, the sheep, the bear, wild boar or some fishes [2, 3, 4, 5, 7, 12, 13, 14, 15, 17].

Introduction

This is a suggestion for a methodological guide to elaborate a computer assisted program of clinical medical diagnosis and approaches different specific faces of daily activity in the medical office. The purpose is to offer information necessary for soft designers to create a software package operating and processing information, helping the medical and clinical diagnosis as well steady as susceptible. The main goal further is to promote a correct, early and rapid treatment and to orientate the patient to the most appropriate and specialized medical services.

The guide's design methodology is based on informational processes and the information flow during physician-patient dialog and anamnesis and all data collecting in the aim of medical clinical diagnosis assessment. All information are sorted, selected and compared with the medical data base, keeping only suggestive information used to elaborate a software assisting procedure for medical diagnosis.

A methodological guide should assure the quality of medical procedure, correctly defining the demands of medical practice, managing, correlating and comparing the information as the final results should be significant, correct and real. Medical software should be designed to assure the expected results (diagnosis production,

reproducibility of diagnosis for similar information), to be flexible, easy to understand, access and operate, to accept reviews, changes and completion.

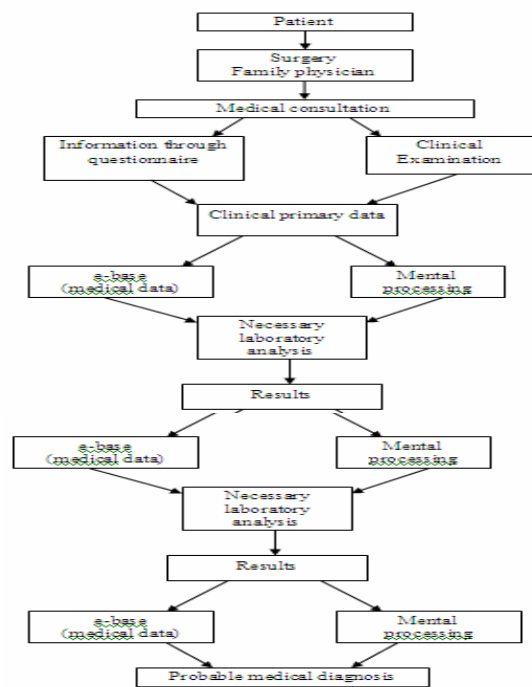The general information flow is represented in figure no 1.

Figure 1 – General flux of medical data

Objective:

The present paper suggests the opportunity to create a software to assist the medical diagnosis in human trichinellosis in general practice enabling a rapid orientation to correct diagnosis (even susceptive diagnosis) and to guide the patient to specialized medical services (infectious diseases, parasitology) in the aim of rapid confirmation of susceptive diagnosis, treatment initiation and patient monitoring toward healing stage. The opportunity is sustained with data from international data bases and an original study developed in the aim of identifying the difficulties in trichinellosis diagnosis and consequently, the idea of improving the diagnosis procedure.

Method:

A retrospective study was developed in Infectious Diseases County Hospital of Brasov, Romania, as a base of argumentation for the necessity of creating and applying a software program designed to assist the primary care diagnosis of different aspects and cases and to supervise the management of Trichinella infection in humans.

Results and discussions:

In the last 10 years a lot of cases of trichinellosis were registered in Brasov and acquired admission into the hospital and special assistance and medical care.
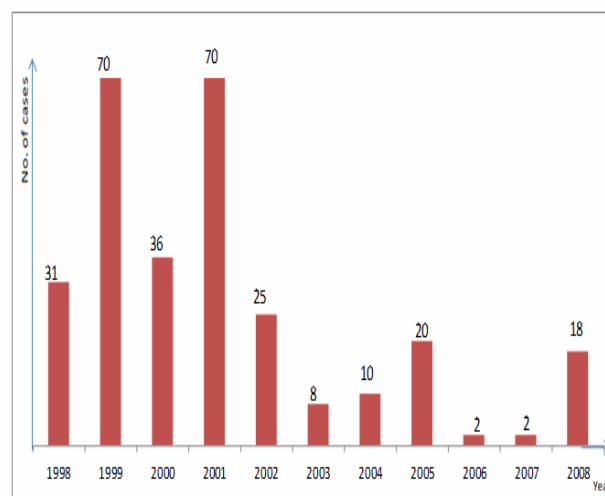

Fug.2 – Yearly hospitalization in Infections Disease Hospital of Braşov

Similar situation is reported in medical literature. Numerous papers mention the presence and persistence of trichinellosis in humans all around the world. Neghina et al. Mentioned that during 1996-2006 in Arad County, Romania, were hospitalized 335 patients with trichinellosis [11]; in France were reported five cases of trichinellosis in September 2009 after grizzly meat consumption in Canada [6]; in Lithuania was reported an outbreak of trichinellosis due to wild bear meat in June 2009, affected 107 people [1]; Poland reported 292 cases of human trichinellosis in 2007 [14] and United States reported to CDC (Center of Diseases Control) a total of 66 cases during 2002-2007 [16]; Taiwan suffered an outbreak of human trichinellosis in 2008 [10].

Brasov study diagnosed trichinellosis in both men and women and all ages (adults and children), in county side as well as town area.

	Adults	Children	Male	Female	Urban	Rural
Number of cases	224	68	133	159	154	138
% Cases	76,71%	23,29%	45,55%	54,45%	52,74%	47.26%

Table 1. – Frequency of hospitalization for trichinellosis depending on age, sex and origin of the patients (Infections Disease Hospital of Brasov 1998-2008)

220 patients with symptoms were admitted in hospital in five years (1998-2002) and most of them asked for medical attention in the second week of the illness occurrence and after that moment.
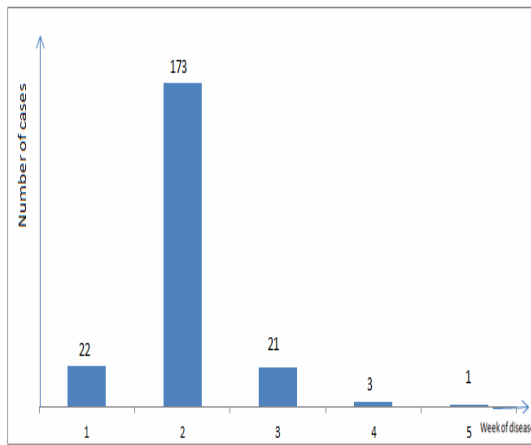

Fig.3. – Hospitalizations for trichinellosis depending on age of the illness (in weeks)

Possible complications of trichinellosis from the second week of illness evolution motivate hospital admission of patients. The delay off treatment application is caused by late medical consultation request and late correct diagnosis.

The disease showed different clinical forms with the predominance of medium (150 cases) and severe forms (31 cases).
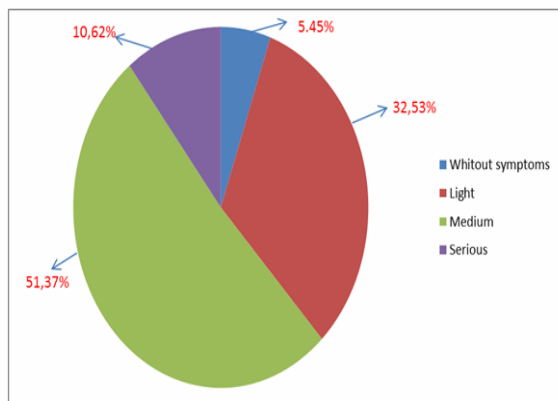

Fig.4. Clinical aspects (forms) of trichinellosis depending on intensity of the symptomatology

Among possible complications, heart impairment symptoms (tachycardia, chest pain, palpitations) were reported in 31% of the patients. Trichinellosis myocarditis is one of the most severe complications and was reported in 13.33% of the cases. Nemet et al. reported a higher frequency of cardiac complications – 31% [12]; Laiskonis et al. [8] and Lazarevic et al. [9]

reported cardiac complications as myocarditis in 10.5-16% of cases.

In conclusion, the study shows that human trichinellosis has persistent morbidity, affects people no matter the age or environment of living (town or county), both sexes. Correct diagnosis is often late and very late and consequently the treatment is applied with delay and the clinical evolution could reach severe and life threatening complications.

As follow, we consider very appropriate to create and to implement a computer assisted program in general practitioners' offices in the aim to facilitate the diagnosis. Next, there are presented the main steps of "thinking" the medical process which should lead to designing the software program considering the processes involved and the requests and exigencies of applications in daily medical practice.

The flow of data collecting and information processing

The definition of medical diagnosis represents the addition of clinical and paraclinical investigations aiming to define the patient's health status or illness, forcing the physician to strictly follow the steps of informational flow structured on patient's data collected during medical examination.

Informatics' processes and information flow progress in two stages: the first stage is the informational process aiming to establish a presumptive diagnosis and the second stage is the informative process leading to complete and final medical clinical diagnosis.

Informational flow goes during medical examination from doctor to patient (through questionnaires, patient's inquiring) and feed-back connection, from patient to doctor (patient's answers), enabling the doctor to establish the presumptive diagnosis. The questionnaire is designed with target-questions, giving key-information, essential for diagnosis.

Questionnaire's design

Questionnaire's design represents a complex key activity regarding collecting right primary information. It should be conceived structured on questions focused and particularly addressed to the patient, assuring that the information received from patient is the most specific, giving the best orientation and leading to a complete and correct diagnosis.

The questions should be accessible, direct, laconic and short and focus on the subject. The quizzing action should be rigorous and complete. As a basic principle, choosing the right questions focused on the established purpose depends on knowing from the beginning the type of information we are looking for, the way of questions we should design in the aim to obtain the expected information, the way of chaining the question

(sometimes "water fall" questions). A good interpretation of patient answers leading to a correct and rapid diagnosis depends as well on the best chaining and sorting of data and on the best correlation of their importance, representative and specificity.

Primary evaluation

Primary evaluation in general practitioner office includes the clinical examination of the patient, too, orientated on the apparatus and systems with signs of illness or impair, as well as on those systems apparently free of symptoms, but indicated to be possible affected in the context of presumptive diagnosis newly established based on patient's quiz.

Primary information

Primary information is automatically processed by doctor mind following his own capacity of interpreting and based on his medical experience and compared with the information in data base. Informational processing (information correlation and comparison) takes over primary information, removes non significant information, makes connection and comparison with similar information in data base and keeps the significant information only, used by doctor to establish the clinical presumptive diagnosis. Concurrent, according to clinical severity of the case, the following steps are pursued:

1. Series of paraclinical investigation (lab tests, other investigations) with the purpose to complete the information obtained by medical examination in general practitioner office or

2. Referral to specialized medical services (infectious diseases, parasitology) when the presumptive clinical diagnosis reaches a suspicion which demands urgent additional investigations and rapid specific therapy settle.

Figures 5 and 6 syntheses the steps of trichinellosis infections diagnosis necessary to be strictly followed in general practitioner practice, including the intermediary level of possible and probable diagnosis.
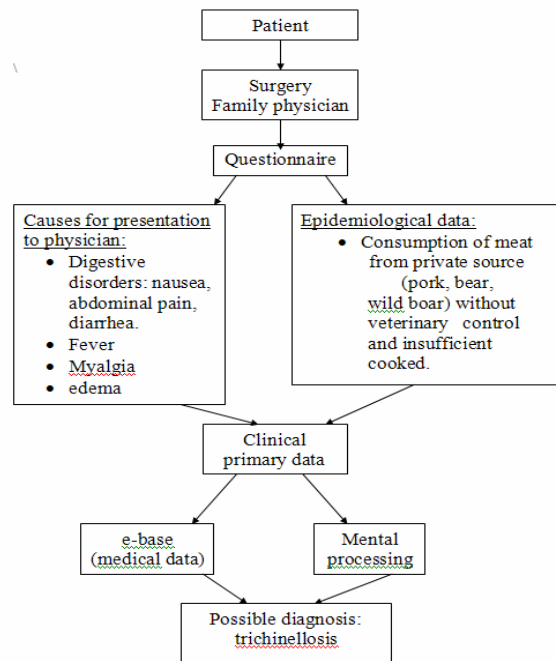

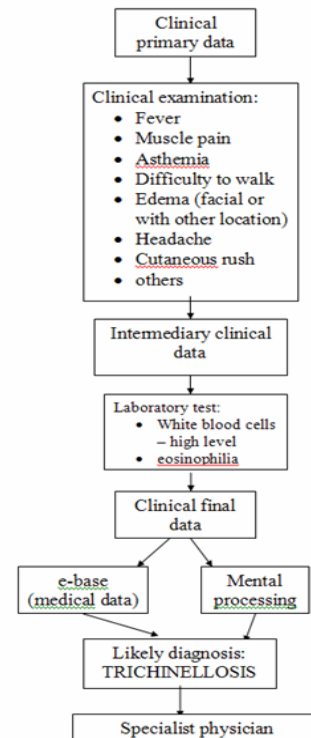*Figure 5 – Questionnaire – basic stages in trichinellosis diagnosis*

Figure 6 – Clinical examination and laboratory analysis – intermediary and final stages in trichinellosis diagnosis

CONCLUSIONS:

Software guidance of medical practice in general practitioner office regarding the diagnosis of human trichinellosis infection could have an important impact in rapid diagnosis presumption and in a correct medical attitude and protocol related to the illness and to the patient as well (referral to specialized services for treatment and monitoring). The delay of diagnosis is avoided as well the confusion with other diseases and the possibility of worsening evolution in the absence of prompt and specific treatment.

Testing the software guidance of medical practice for the diagnosis of human infection with Trichinella could lead to a future extensive application in the diagnosis of many other illnesses or activities in medical practice which involve the same steps in diagnosis, monitoring and treatment possible to be accomplished with computer assistance.

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