

STRUCTURING OF ELECTRONIC HEALTH RECORD IN OCCUPATIONAL MEDICINE – LEGAL REQUIREMENTS AND ASSESSMENT ELEMENTS

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ABSTRACT. Ensuring effective informational management in the practice of occupational medicine requires the employment of Electronic Health Record. Electronic Health Record structuring must take into account the general minimum requirements referring to its functions, in compliance with national legislation. Based on these considerations, the current paper proposes an Electronic Health Record model and a modality of assessment for application in occupational medicine. The study of these requirements led to an Electronic Health Record model structure. The type and format of the given data in order to ensure interoperability for future medical filing systems, starting from information circuits specific for the medical office, led to a model of electronic health file. Starting from the necessity of its implementation in medical practice, ways of its evaluation and acceptance in current medical practice were outlined.

Keywords: occupational health, standards, classification, evaluation criteria, work place

INTRODUCTION

Medical information, characterized by a variety of types and degrees of structuring as well as a growing volume, needs to be accessed from different sources and time tracked within and between different episodes of medical care in connection with a topic. Rapid processing using electronic media is also of crucial importance as rapid access to information from different sources cannot be done effectively using the paper medium.

The adoption of such systems started rather late in Romania. The National Health Insurance House has imposed the adoption of a Single Integrated System of electronic reporting and record keeping in primary healthcare, provided by family medicine services. With all the difficulties of implementation at national level and the relative resistance from health professionals, through successive improvements brought to the system it has represented an important step in using electronic media in family medicine.

During the period December 15th 2009 and December 15th 2010, implementation and

Coordination Unit of the Ministry of Health Program stated its aim within the project "Technical assistance to interoperability providers of occupational medicine standard data bases" to develop the platform of interoperable informatics of standard data bases for integrated management of occupational health and working environment, workplace organization and technologic security. Although such a goal seems extremely optimistic under the current conditions, it shows the importance of using the electronic medical File as well as raising the awareness of stakeholders and decision taking forums in this respect.

MATERIALS AND METHODS

Based on legal requirements for file structuring in occupational medicine and from international requirements regarding the certification of electronic health files, a model of Electronic Health Record structuring was created in occupational medicine. Subsequently elements of its evaluation are synthesized through its employment by specialists.

Currently, the Romanian legislation does not explicitly stipulate the use of the electronic medium for the storage of medical data, but at the same time it does not prohibit it. Medical records which provide health surveillance of workers are divided into two main sections with two corresponding types of information being stored:

-Non-medical data: general, referring to the socio economic unit, the employer, specific to that place of work.

These data are contained mainly in the employment application file and file identification of occupational risk factors

- Medical data contained in medical records themselves.

The structure and type of medical record information are provided by the current enforced legislation (GD 355/2007), any constituency of Electronic Health Record having to start from these considerations and include all types of data, allowing at least a listing of identification sheet of occupational risk factors, of the medical file itself as well as of the ability certificate.

In order to integrate information on labor accidents it is now necessary to use medical record data on specific pathology of labor accidents (Gov Order no. 3 January 3, 2007) approving the registration form for labor accidents - FIAM.

Although required by law, a viable Electronic Health Record should include specific structures in order to realize some additional features required by international certification criteria.

The United States and the European Union through their Certification Commission for Healthcare Information Technology and the European Institute for Health Records respectively, have separately developed general evaluation criteria for certification of the electronic health file. Out of the following seven functional criteria for assessing the Electronic Health Record quality, the first three listed criteria are at the forefront of all the certification schemes both in Europe and the U.S.:

1. Medication management

2. Health evaluation and diagnosis documenting

3. Care planning and sharing

4. Documenting results, security, demographics, alerts, notifications and reminders

Given the specific of occupational medicine activities, focused on prevention, health status assessment and labor capacity, the test for health assessment and documentation of diagnosis are essential. We mainly mention the need to present the following types of information:

Care episode, occupational health features for episodes of care are also represented by the association at any episode of all information on the work place and issuing of an ability certificate.

Medical and legal aspects, recording of the party responsible for each element of the care episode. Sharing between specific users: doctors, worker, employer, provider / insurer.

Documentation of clinical diagnosis with diagnosis by explanatory annotations through explanatory notes in text form fields, in possible association with specific hazard factors for that workplace.

Links between entries: logical, clearly stated links among the data input (health problems, diagnoses) and procedures, referrals, interventions, measures, recommendations and amendments to the man-machine-work system

Clinical terminology, coding systems and standards used: ICD 10, ICPC, CAEN, COR, etc..

Prophylaxis: recording information about family risk factors, noxious substances, individual or collective prevention measures

RESULTS AND DISCUSSIONS

A model structure of the Electronic Health Record was developed starting from legal requirements in occupational medicine and the assessment of electronic file quality. For reasons of similarity with GD 355/2007 the data fields were given the same names for keeping a record of workstations, of data on occupational medicine consultation and ability certification.

The application, called Medmun was subsequently posted for download at the following web address: www.arhimedes.ro/medmun in order to be feely evaluated, together two questionnaires to be completed by specialist physicians, before and after use. Opinions of other users outside the two questionnaires could be posted at www.arhimedes.ro/forum. Expressed views may lead to improvements of this application.

Application interface (Fig. 1) shows the top bar of six main groups of options

- Definitions
- Documents
- Statistics
- Nomenclatures
- Tools
- Help

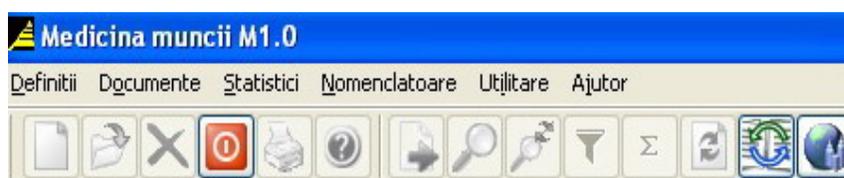


Fig. 1 The main sections of the application

A. Definitions

Includes the following options starting from the necessity of defining each of the actors involved in the episodes of medical care: physician, social and economic unit, the patient.

Optionally, the application has two kinds of work intervals: the exercise and the period.

The exercise: exercise period that starts to introduce the documents (will be inserted or changed only when creating a new unit, it is automatically incremented upon exercise closure). After the end of this exercise duration, it is archived with no possibility of alteration or change of entered data. Although for the doctors it does not represent a facility, in terms of legal requirements regarding the accuracy of records, it is of absolute necessity. A period equal to one calendar month is recommended to be chosen.

If a work **period** from a closed exercise (archived) is chosen, the application does not allow insertion, alteration or deletion of documents in this period. In order to view reports in closed exercises, it is not necessary to modify the work period, the ratio period

being able to be modified directly from the report generation screen.

Definition in this section of tax identification data, location, field of activity by employing the CAEN coding legal representative and medical and occupational physician provider, are essential to be defined both for the providing medical unit and the receiving units of occupational health services. Subsequent to definition, general date of the employer will be completed with the definition of workstations (Figure 2) and then of the patients or workers of this unit.

Work order input is unit-jobs-patients: the unit must be defined first, then post or posts within the unit and only after that patient data will be entered. Forced, vicious, positions, professional gestures allow free text saving, osteo-muscular and articular overload, visuals, hearing, stress, manual handling of loads, also allow choice by their classification in presence of strain - checked field or absence - unchecked field. Risks are considered to be accidents, allowing their choice by ticking. For those not covered by the predefined fields, other risks may be mentioned in free text format.

Operations performed by the worker can be described by free text. Chemical agents are selected from. This list is legally stipulated under the Government Decision no. 1218 of 06/09/2006(GD 1218/2006). This option was preferred in order to allow comparable and interoperable processing in time. By clicking the "List of chemical agents" the window "chemical agents" pops up, "Noxious agent" is selected in the bottom bar that will display a list of taxonomies according to GD 1218/2006. For powders, the powder may be mentioned by name through the text field

with corresponding tick if it exceeds the maximum permissible value

Similar data storage is used in the fields "air temperature", "air pressure", "Humidity", "type" – of non-ionizing radiation. Work place lighting can be artificial, natural, mixed mention being made whether it is "enough" or "insufficient".

Checking or unchecking the bottom right button "Description" allows visualization of the text document of all the job characteristics (Fig3.). They enable specific text processing

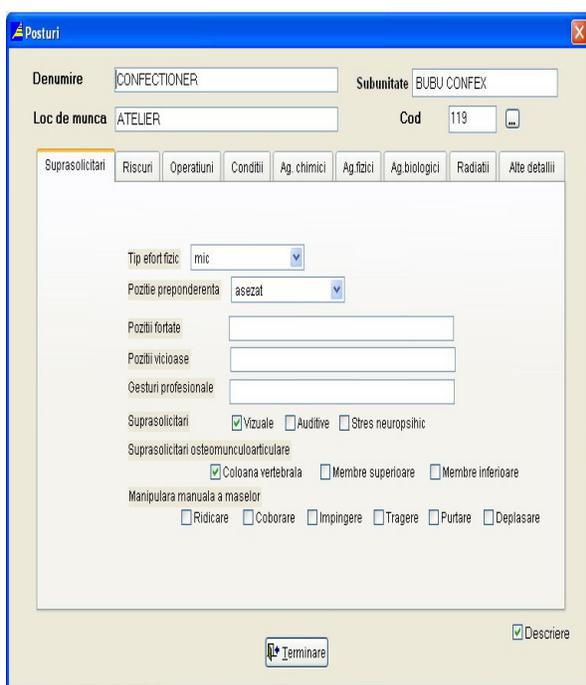


Fig. 2 Components of the workstation definition

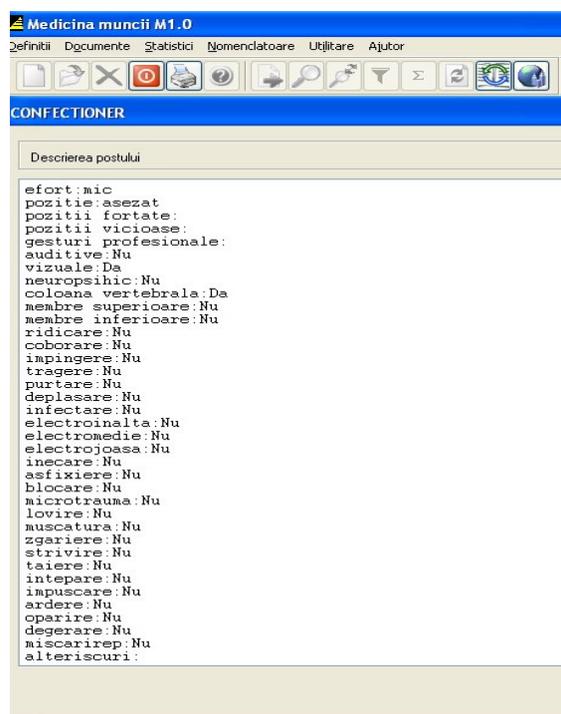


Fig. 3 synthesizing the elements of the workstation in text format

Workplace biological agents may be chosen from their legally provided nomenclature: Gov. Decision no. 1092 of 16.08.2006 (Gov. Decision no. 1092) regarding the protection of workers against risks related to exposure to biological agents at work.

Entering a patient may request your name, Identity code and employing unit.

B. Section "Documents"

Has two subgroups:

Consultations Registry

Appointments

Consultations Registry. This registry is defined specifically for each medical unit, authorized point of commercial companies providing medical care.

Tip	Numar	Data	CNP	Pacient	Unitate	Aviz
ANG	16	01.01.2008	2600324243674	OROS LUCIA	OCOLUL SILVIC UL Apt	Conditional
ANG	17	01.01.2008	1490414242532	BUTEANU IOAN	OCOLUL SILVIC UL Apt	
PER	18	01.01.2008	1591201243676	MERLAS MIRCEA	OCOLUL SILVIC UL Apt	
PER	19	01.01.2008	1711210243676	BANCOS ROMULUS	OCOLUL SILVIC UL Apt	
ANG	1	01.01.2010	1630511240042	PETRIC ADRIAN	AVIMAR SA	
ANG	2	01.01.2010	1571129242531	SILIMON VASILE	HOUSE CHIFOR SF	
ANG	3	01.01.2010	1731109242544	NECHITA IOAN	HOUSE CHIFOR SF	
ANG	5	07.01.2010	1821121313956	SZASZ ROBERT	SZASZ INTENATION	
ANG	6	07.01.2010	1970316245032	LUCA VLAD	SZASZ INTENATION	
ANG	7	07.01.2010	1680223068014	PURJA BOB MAXIM	SZASZ INTENATION	
PER	4	07.01.2010	1841208313854	SZASZ ISTVAN	SZASZ INTENATION Apt	
ANG	9	07.01.2010	2690425245037	GHERASIM ARDELEAN	.NULL	Apt
ANG	10	07.01.2010	2620505240105	PARJOL SIMONA ELENA	CASA RUSU	Apt
ANG	11	07.01.2010	2761126241526	PODUT FLORIAN EUSEF	MFM MURESAN SI Apt	
ANG	8	07.01.2010	1890113240010	BUD CIPRIAN	OCOLUL SILVIC GR	
ALT	12	07.01.2010	2620815240021	SLEAM MARINELA	.NULL	Apt
PER	25	07.01.2010	1640809243671	DULF VASILE	OCOLUL SILVIC UL Apt	Conditional

Fig. 4 Consultations Registry

Accessing medical records leads to consultation of the medical file itself. For "work accidents" the following data are inserted: event date, Injury, Location, Name, classified according to FIAM and classification of the same event in terms of ICD 10. Items of pathological history are recorded primarily by year of occurrence, named, inserted as free text, ICD 10 classification of the disease. "Medical leave" enables recording, if it is periodical medical examination and not employment, data on sick leave, including classification by CIM and ICD 10 Code of indemnity. In addition to GD 55/2007 boxes/fields are provided for known allergies, treatments performed with ATC coded medication and associated procedures. The symptoms field allows classification according to ICPC2 taxonomy.

Upon examination, ticking a box implies normal relations, unchecking it displays fields for filling. For reasons of user friendliness, the field "medical examination" is checked. Where pathological aspects are observed, the doctor will record them in text by unchecking that box.

Fig. 5 interface within history in text format

The field "Additional Tests" has several groups of investigations:

- Laboratory examinations and laboratory
- "Specialized Exams"
- "Other investigations"
- "Audiometry"
- "Ventilatory tests"
- "Specific occupational health examinations".

"Paraclinical and laboratory examinations"

By clicking the "laboratory" button, the "laboratory" window is activated, containing all toxicological investigations under GD 355/2007. In addition, other types of investigations can be added. Warning! Once introduced, the investigation will be saved and will in turn alter the nomenclature.

For specialist consultation, specialty is selected by clicking 'specialist' at the bottom, and this will show medical specialty nomenclature, the specialist's diagnosis and the attached code according to ICD 10 as well as the recommendations made by the specialist, "Recommendations" – under the form of free text.

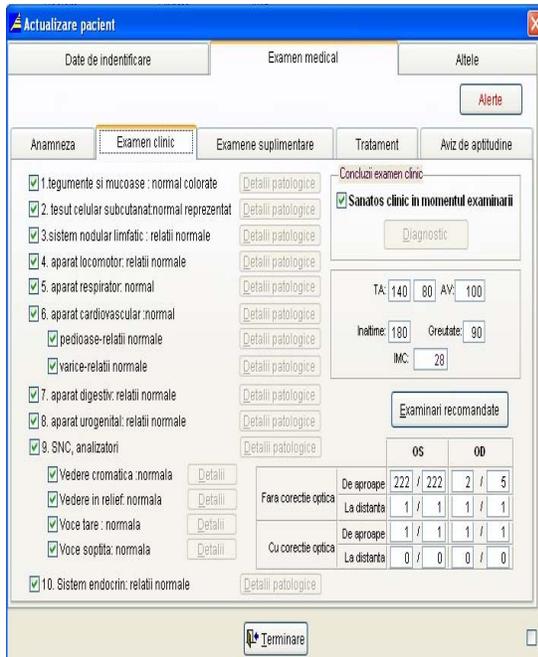


Fig. 6 Interface in the medical examination

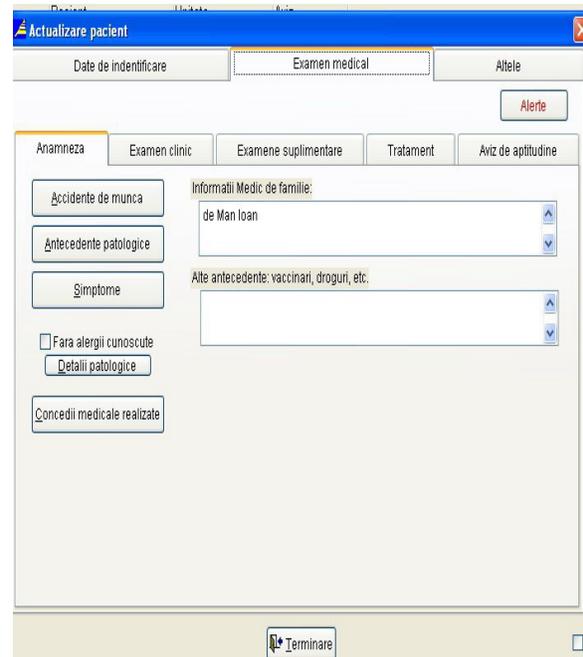


Fig. 7 interface within history in text format

-“Other investigations”

"Investigations" will retrieve the window with the same name and the name of the investigation can be selected. The window contains all investigations under GD 355/2007. The field "Text" allows free annotations.

In addition, the professionogram is provided, manual handling of weights, cardiovascular functional tests as well as other methods that were not included in these fields in the form of free text. Alerts related to treatment are activated, if allergies were mentioned in the history of allergies - “see Allergies" appears in the text box treatment.

A “Programming” module of consultations per day, duration, time, patient or business is included here.

C. "Statistics"

Allows display and listing according to the introduced data of the following:

Risk factors file according to the unit and its workstations

Medical record, partial or total,

The following can also be listed according to the name and its number in the consultations registry:

- Paraclinical reference
- Professional reference
- Signaling file BP1 (Annex 19)
- Ability file (Annex
- Medical Letter
- Simplified Medical Letter
- Prescription

Units allow listing according to unit and chosen work interval of the following types of reports:

- Report by employer
- Report by the insurer (payer)
- Report by the Public Health Authority
- General Report
- Report by employer medical control, nominal.

If the employer provides the average number of employees in the reporting period, then the statistics of morbidity with temporary disability will give the frequency and severity of morbidity, otherwise it will show the number of initial medical leave certificates as

well as the duration of medical leaves during the interval

D. "Nomenclatures"

Allows listing the major nomenclature catalogs used: ATC classification of drugs, classification of occupations, CIM 999, ICD10, ICPC2, CAEN codes, procedures, examinations, biological agents, chemical agents, corporate types

Standards for classifying the data used are NACE rev1-revised version of the economic activities in the European variant CAEN-ISCO-88 International Standard Classification of Occupations International Classification variant COR-professional status according to ILO and FIAM respectively - diseases: in accordance with International Classification of Disease Ed 10 (International Classification of Disease, ICD-10). For the classification of medical procedures and investigations: Australian Classification of health interventions, the International Statistical Classification of Diseases and Health Problems, Tenth Revision, Australian Modifications (CIM-10-AM), ATC-code, Anatomical Therapeutic Chemical medicine treatment

-Symptoms according to ICPC-2 classification, International Classification for primary care, 2nd edition of classification of specific data used for research on FIAM labor accidents : effect on body, lesion location, work environment, Manner of injury , the actual physical action, drift, material agent, causes: dependent on executor / input / work load / work environment, employer identification information, legal form, the form of equity, the CNP / CUI of employer / tutor, the work undertaken , encoding by geographic location These data types are included in the file to be completed individually by health workers as legally prescribed.

E. Tools

The "Tools" allows the definition of supervisor, user or a guest user to access the application with full setup supervisor rights to view the data and just visualization rights for guests.

Pre-evaluation is performed using a questionnaire which contains questions about sex, age, duration of professional activity, number of employees that the physician offers health surveillance, professional status of occupational medicine physician, level of knowledge computing. Subsequently applied questions about obstacles that occupational health physicians encounter to use Electronic Health Record, their expectations about it, availability they have in using the electronic format, if they had only used the paper based version or of a partial Electronic Health Record form. Pre-evaluation starts from existing data obtained by U.S. studies where, despite all efforts by medical providers including government incentives have succeeded to implement the Electronic Health Record only partially in current medical practice.

A questionnaire-based evaluation of the Electronic Health Record components will be performed after a 6-months period starting from the seven criteria for assessing the quality of the Electronic Health Record above mentioned advantages, ease of performing information management activities, ease of using factors that may facilitate implementation in practice of occupational medicine of such a Electronic Health Record of the doctor's strategy to implement the Electronic Health Record in future medical practice.

Questionnaires will be distributed to employers and employees and public health units as well as other socio economic units to assess the possible resistance or support to use the Electronic Health Record in the practice of occupational medicine.

CONCLUSIONS

Questionnaires will be distributed to employers and employees and public health units as well as other socio economic units to assess the possible resistance or support to use the Electronic Health Record in the practice of occupational medicine.

The Electronic Health Record model started from legislation trying to integrate the main functions and criteria required by

certification bodies in Europe and the U.S. Starting from this model, identification of future development directions is targeted about how to implement Electronic Health Record in practice with specialists in occupational medicine on a pilot study conducted in four counties in the country.

The main obstacles as well as incentives in the adoption of occupational health services activities are to be identified

in order to recommend appropriate measures for implementing Electronic Health Record in practice. In the field of occupational medicine that compared to family medicine, has no national insurer to impose the adoption of integrated electronic health File with its specific elements, the lack of coherent policies to stimulate the Health Ministry's adoption by providers of occupational health services in the practice of occupational medicine in the near future, remains a goal.

Its employment is even more imperative as the supervision and promotion of health workers belongs to priority areas of public health in the EU.

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