New opportunities for the analysis of the medical prescriptions. Advantages of the pharmaceutical unification form of administration

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ABSTRACT: e-Prescription is an extra feature of ICmed system that allows you to write and send prescriptions electronically to your local pharmacies. ePrescription uses a service called e-communication itegrate in medical informatics platform that forwards prescriptions from the physician to the pharmacist. ePrescription can be set up for bi-directional communication so that pharmacists and doctors can send new prescriptions and refill requests electronically. ePrescription uses the drug database.
KEYWORDS: e-Prescription, medical informatics platform, ATC classification, codification standard.

Introduction

Analysis of medical prescriptions grows in importance as a natural consequence of interest caused by escalating costs of medical treatment in all the European countries in general and particularly in Romania. Removing limits on pharmacy comes to underline the need for statistical analysis as the finest prescription drugs.

The Romanian company, a provider of innovative IT solutions and services for e-health, came to meet this need, seeking to find new ways to increase the quality standardization of the product information, with immediate application in refining the statistical analysis. Like the ATC

classification we have tried to identify a standard classification in terms of drug dosage form of presentation. As we have not find a classification to satisfy our aim, we proceeded to establish a pharmaceutical form, to cover as many aspects as possible. Then we started to correct the medicines database in Romania, from the new classification and finally we have made some statistics based on the new classification using prescribing data from the medical informatics platform, opening the opportunity for further deeper statistical analysis.

1. Objective

- Initial considerations

The need to address new opportunities in the analysis of the medical prescriptions imposed by the drug treatment costs growth in Europe in general and especially in Romania, has led the company research team to identify new opportunities starting from data about drugs.

Data on drugs, as they are currently structured, except for the ATC classification and the criteria of price, offers little grounds for complex statistics. We have identified the opportunity to consider a new criterion, namely *the pharmaceutical / the dosage form*.

- Findings related to the dosage form

Drug database provided by the National Medicines Agency (NMA) in its initial form, but in all the other forms, too (provided by the Ministry of Health National, the Health Insurance House) shows the pharmaceutical forms as texts, with abbreviations.

Similar formulations (text) can be found in drugs data of other countries such as Germany or Hungary. In Germany, three-letter abbreviations are used; however it is not practical for statistical classification.

Besides the fact that the pharmaceutical form has a text form, in many cases *there are several names for the same dosage form*, they differ in how short they are, the presence or the absence of different spaces in the text and the choice of abbreviations for the same used word.

- Defined objectives of the work

There were three clearly defined objectives:

1. to structure the dosage form on several levels of information (according to several criteria)

2. to correct and to unify the existing pharmaceutical forms from the new classification, obtaining a drug database built on new principles

3. to apply the innovation on a set of data and to determine some statistical indicators where to apply the standardized classification of the dosage forms.

2. Methods and actions

We have started from a total of 420 dosage forms available in drugs databases during July 2006 - July 2008. The standardization was done in three stages.

Stage I.
Cleaning and text processing procedures were applied by:

- The elimination of the extra spaces
- The removal or the entry of points to abbreviations
- The choice of the same abbreviations
- The preservation of the words order in describing the pharmaceutical form

Thus, we have reduced the number of pharmaceutical forms from 420 to 320.

Example: Instead of three forms for the enteric-coated tablets (COMPR. FILM, COMPR. FILM, and COMPR.FILM) we had only one form (COMPR. FILM).

Stage II.
Dosage forms characteristics were defined on five levels, respecting the following aspects:

- The route of administration (*oral, parenterally, inhalation, vaginal, etc.*)
- The physical presentation (*tablet, capsule, concentrated, lyophilized, powder, etc.*)
- Parenterally mode of administration (*injection or infusion on one hand and the place on the other hand - intramuscular, intravenous, intraocular, etc.*)
- Special physical properties of the presentation form (***enteric-coated tablets, chewable, soft***, etc.)

- Special properties in terms of action (*how to issue them, the gastric resistance, etc.*)

One or two letters have been used for each level, for coding. The property that did need to be characterized was noted with **X**.

Stage III.
Using the new coding, all the pharmaceutical forms of presentation have been defined and the database has been updated.

3. Results

- *Results of the cleaning and processing text stage*

After applying the above mentioned operations, we have reduced the number of drug forms from 420 to 320. The improvement expressed in percentage is of 23.81%.

Example: Instead of three forms for the enteric-coated tablets (COMPR. FILM , COMPR. FILM. And COMPR.FILM) we had only one form (COMPR. FILM).

- *Coding operation results*

As a consequence of the implementation of the five coding levels there have remained only 209 codes. The improvement expressed in percentage is of 50.24%.

The codification is on seven characters, divided into five levels. The lack of a feature is denoted by X, to keep the hierarchical nature of the classification.

An example of coding for capsules is presented in the following Table 1:

Table 1. Coding for capsules

Denumire scurta	C1	C2	C3	C4	C5	Denumire lunga
CAPS.	O	CA	XX	X	X	Capsule
CAPS. CU MICROSFERE	O	CA	XX	Y	X	Capsule cu microsfere
CAPS. CU MINI-COMPR. GASTROREZ	O	CA	XX	S	G	Capsule cu minicomprimate gastrorezistente
CAPS. CU PULB.INHAL.	I	CA	XX	P	X	Capsule cu pulbere inhalanta
CAPS. ELIB. MODIF.	O	CA	XX	X	M	Capsule cu eliberare modificata
CAPS. ELIB. PREL.	O	CA	XX	X	P	Capsule cu eliberare prelungita
CAPS. ENTER.	O	CA	XX	X	E	Capsule enterosolubile
CAPS. GASTROREZ.	O	CA	XX	X	G	Capsule gastrorezistente
CAPS. MOI	O	CA	XX	M	X	Capsule moi
CAPS. MOI GASTROREZ.	O	CA	XX	M	G	Capsule moi gastrorezistente
CAPS. MOI VAG.	V	CA	XX	M	X	Capsule moi vaginale
CAPS. PULB. MICRONIZATA	O	CA	XX	P	X	Capsule cu pulbere micronizata
CAPS. RET.	O	CA	XX	X	R	Capsule cu eliberare retard
CAPS. VAG.	V	CA	XX	X	X	Capsule vaginale

- *Results of coding the medicines database*

Using the new drugs database coding, we could make different assessments on the number of drugs available, having one or more required features.

In the following example (Table 2.) you can see the distribution of the number of drugs available, depending on the route of administration for the first 10 routes of administration.

Table 2. The distribution of the number of drugs available

Cod C1	Descriere	Numar medicamente	Procent
O	Oral	13019	65,45
P	Parenteral	4746	23,86
T	Topic	657	3,30
X	Dispozitive	470	2,36
H	Oftalmic	241	1,21
I	Inhalator	211	1,06
D	Transdermic	176	0,88
R	Rectal	117	0,59
N	Nazal	89	0,45
V	Vaginal	80	0,40

The distribution of the number of drugs within an ATC class (e.g. *Class N - Central Nervous System*) *The results of coding on a data set obtained from the prescription of drugs made using the ICMed computer system.*

Table 3. The distribution of the number of drugs within an ATC class

Cod C1	Descriere	Numar medicamente	Procent
O	Oral	3477	88,47
P	Parenteral	238	6,06
D	Transdermic	145	3,69
R	Rectal	30	0,76
I	Inhalator	19	0,48
S	Sublingual	6	0,15

To assess the statistical application of new forms of encoding a data set obtained from the company ICMed computer system was applied and which is used by about 500 medical services providers to manage over 500.000 unique electronic patient records.

The percentage of prescriptions for drugs class ATC A02 (Drugs for acid related disorders, Table 4.and Figure 1.) was assessed, according to the dosage form codes for a total number of 6205 drug prescriptions. You can easily notice significant differences in terms of pharmaceutical form chosen, depending on the county, which shows certain patterns in choosing the medicines.

Table 4. The percentage of prescriptions for drugs class ATC A02

COD FF	Descriere FF	TIMIS	ARAD
OCAXXXG	CAPS. GASTROREZ.	**65,88**	**58,34**
OCOXXFG	COMPR. FILM. GASTROREZ.	**10,81**	**19,55**
OCOXXXX	COMPR.	9,10	10,84
OCOXXFX	COMPR. FILM.	7,79	5,95
OCAXXXE	CAPS. ENTER.	**3,97**	**0,11**
OCOXXXG	COMPR. GASTROREZ.	**0,97**	**0,00**
OCOXXBX	COMPR. MAST.	0,78	0,53
PLIIXOX	LIOF. PT. SOL. INJ.	0,30	0,32
OCAXXXX	CAPS.	**0,25**	**4,04**

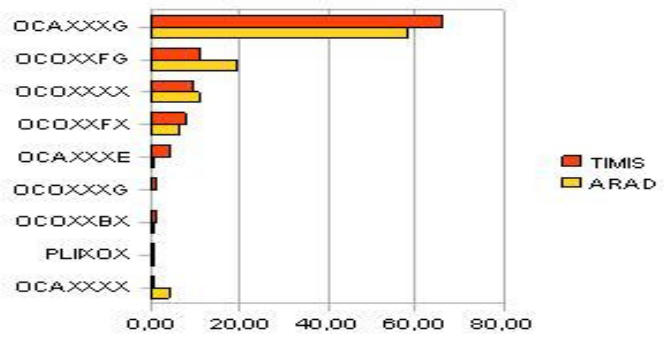

Figure 1. The percentage of prescriptions for drugs class ATC A02 in Timis and Arad

Conclusions and future opportunities

The introduction of the codification standard dosage forms reduced to half the initial number of forms and allowed the correct evaluation of the number of products from the medication database, according to various practical criteria. Moreover, using the dataset obtained from the ICMed computer system used in primary care conclusions can be drawn on the choice of family doctors and specialists, leading indirectly to new opportunities to improve the quality of the medical activity.

The following objectives are aimed at in the future:

- Refining coding for the best possible quality
- Coding operation by complex statistics (based even on correlations using the ATC coding and diagnostic coding CIM999, respectively ICD10)
- Codification extension to other characteristics of drugs such as packaging, dosing, concentration.

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