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Clinical-economic analysis of the use of non-steroidal anti-inflammatory drugs at the stationary level

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Introduction.

Nonsteroidal anti-inflammatory drugs are of undeniable importance to practical health care, as physicians have been using them in daily practice for more than a century. They are considered effective as anti-inflammatory, analgesic and antipyretic agents. Also, non-steroidal anti-inflammatory drugs play an important role in the treatment of diseases of the musculoskeletal system. More than 30 million people have to take them continuously, 300 million with short-term use (up to 200 million of them buy drugs without a doctor's prescription) [1,2].

It should also be noted that non-steroidal anti-inflammatory drugs occupy a leading position in terms of sales and contribute significantly to the costs of both the health care system and society as a whole. In addition, the range of this group is constantly updated, and especially due to the high frequency of their use, it is important to conduct clinical economic studies [3,4].

The **aim of the study** was to carry out a clinical economic analysis of non-steroidal anti-inflammatory drugs used in the medical center.

To achieve the goal, the following tasks were set.

- to study and generalize the literature data about the methods of clinical economic analysis of drugs,

- to receive an information file from the selected medical center about the non-steroidal anti-inflammatory drugs used in the medical center, for at least 1 year,
- analyze the non-steroidal anti-inflammatory drugs included in the information file using the ATC/DDD and DU90% analysis methods,
- perform VEN analysis of drugs and combine it with DU90% analysis.
- draw conclusions based on the data obtained.

Materials and methods.

Data on the use of non-steroidal anti-inflammatory drugs by one of the multi-specialty medical center of the Republic of Armenia were the materials for the research. 1 year of data was taken.

In the file provided by the medical center, the names of the used drugs (commercial) with units of measurement of the dosage form, quantities and monetary value of the unit were presented.

Research methods. clinical-economic, content-analysis, graphic-analytical, structural, segmentation, grouping. ATC/DDD methodology, DU90% and VEN analysis methods were used from the clinical-economic research methods [5-9].

Results and their discussion

First of all, the list of drugs with commercial names, quantities and unit values, which were purchased and used in the medical center during 1 year, was given by the medical center for conducting research.

The list of drugs was given by Microsoft Excel computer program, further work was also done in that program. The list was reviewed and edited, and non-steroidal anti-inflammatory drugs were highlighted. It was found that non-steroidal anti-inflammatory drugs (13 INN - International Nonproprietary Names) accounted for 4.4% of the list of drugs used in the medical facility according to ATC codes, and 1,9% of the total funds were spent on them.

All non-steroidal anti-inflammatory drug ATCs were added to the list, resulting in an information file where the ATC codes of the drugs were added (table 1).

Table 1: Non-steroidal anti-inflammatory drugs used in the medical center for 1 year

Nº	ATC code	INN	Unit of measurement (dosage form)	Drug demand by dosage form	Drug demand in AMD (Armenian currency, for example \$1 ≈ 390 AMD)
1	N02BA01	Acetylsalicylic acid	tablet	10	76,00
2	M01AE17	Dexketoprofen	tablet	2	512,00
			ampoule	31	14572,48
3	M02AA15	Diclofenac gel	gel	40	73248,00
4	M01AB05	Diclofenac	tablet	2701	63169,04
			ampoule	76	7220,00
			suppository	4525	432077,25
5	M01AX05	Glucosamine	ampoule	378	575618,40
6	M01AE01	Ibuprofen	vial	675	641250,00
			tablet	6232	51532,14
7	M01AB01	Indometacin	tablet	310	3720,00
8	M01AE03	Ketoprofen	ampoule	5	1292,00
9	M01AB15	Ketorolac	ampoule	879	114340,32
10	M01AC06	Meloxicam	ampoule	12	10232,64
			tablet	20	680,00
11	N02BB02	Metamizole Sodium	ampoule	6168	257843,04
			tablet	9	58,59
12	M01AX17	Nimesulide	package	4	403,20
13	N02BE01	Paracetamol	suppository	9205	442120,35
			vial	2	1060,80
			package	1920	3398974,33
			tablet	1645	16223,65

Next, to perform DDD and DU90% analysis, the DDD of the drug was searched in the "ATC Index" published by WHO [8]. Then, for each drug on the list, the number of DDDs—the NDDD—was calculated, and then the percentage of each drug in the total NDDD. The resulting list was edited from largest NDDD to smallest (table 2).

Table 2: Results of ATC/DDD and DU90% analysis of nonsteroidal anti-inflammatory drug use

Nº	ATC code	INN	DDD (mg)	NDDD	%	Cost of 1DDD	DU90% / DU10%
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1	M01AB05	Diclofenac	100	3651,00	48,73%	137,62	DU90%, 1133.70 AMD
2	M01AE01	Ibuprofen	1200	1125,58	15,02%	615,49	
3	N02BB02	Metamizole Sodium	3000	1029,50	13,74%	250,51	
4	M01AB15	Ketorolac	30	879,00	11,73%	130,08	
5	N02BE01	Paracetamol	3000	609,60	8,14%	6329,36	DU10%, 23808.18 AMD
6	M01AB01	Indometacin	100	77,50	1,03%	48,00	
7	M01AX05	Glucosamine	1500	50,40	0,67%	11421,00	
8	M01AC06	Meloxicam	15	32,00	0,43%	341,02	
9	M02AA15	Diclofenac (gel)	100	20,00	0,27%	3662,40	
10	M01AE17	Dexketoprofen	75	11,00	0,15%	1371,32	
11	M01AE03	Ketoprofen	150	3,33	0,04%	387,98	
12	M01AX17	Nimesulide	200	2,00	0,03%	201,60	
13	N02BA01	Acetylsalicylic acid	3000	1,67	0,02%	45,50	
Total				7492,58	100,00%	24941.88	

The largest NDDD value corresponds to diclofenac at 3651, followed by ibuprofen at 1125,58 and metamizole at 1029,5.

To conduct a DU90% analysis, the cost per 1DDD was first calculated for each drug by dividing the amount spent on the drug by the drug's NDDD. Then, taking into account the percentage of each NDDD in the total NDDD, 2 groups of drugs were created: DU90% and DU10%, which as such represent the groups of frequently and rarely used drugs (table 2).

4 drugs are included in DU90% group and the value of 1 DDD in this group is 1133,7, which is 21 times less than the value of 1DDD in DU10% group and this indicates that the use of available drugs prevailed.

Additionally, VEN classification of non-steroidal anti-inflammatory drugs was also carried out, in a formal way, using the VEN classification data available in the literature [9-11]. results were combined with DU90% analysis (Table 3).

Table 3: Results of combining VEN and DU90% analysis

Nº	ATC code	INN	Formal VEN analysis	DU90% / DU10%
1	M01AB05	Diclofenac	V	DU90%, 1133.70 AMD
2	M01AE01	Ibuprofen	V	
3	N02BB02	Metamizole Sodium	V	

4	M01AB15	Ketorolac	N	DU10%, 23808.18 AMD
5	N02BE01	Paracetamol	V	
6	M01AB01	Indometacin	N	
7	M01AX05	Glucosamine	N	
8	M01AC06	Meloxicam	N	
9	M02AA15	Diclofenac (gel)	V	
10	M01AE17	Dexketoprofen	N	
11	M01AE03	Ketoprofen	V	
12	M01AX17	Nimesulide	N	
13	N02BA01	Acetylsalicylic acid	V	

As can be seen from the results in the table, among the non-steroidal anti-inflammatory drugs used in the medical facility, drugs of class N are ketorolac, indomethacin, glucosamine, meloxicam, dexketoprofen and nimesulid, which according to the list of INN make up about 50%. These drugs are also not included in the list of RA Basic drugs (there are others) [11]. Moreover, in the DU90% segment, there is an N-class drug, ketorolac.

Conclusion:

Based on the results, a recommendation was drawn up and sent to the pharmacist of the medical center, who will take into account the results of this work when planning the purchase of drugs for the next year, with the aim of reducing as much as possible the use of class N drugs in the medical center, thus contributing to the effective use of financial resources and not only that.

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