

## PERCEPTION OF INFORMATION ABOUT DRUGS BY A PATIENT AS AN ASPECT OF PHARMACEUTICAL CARE ON THE EXAMPLE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

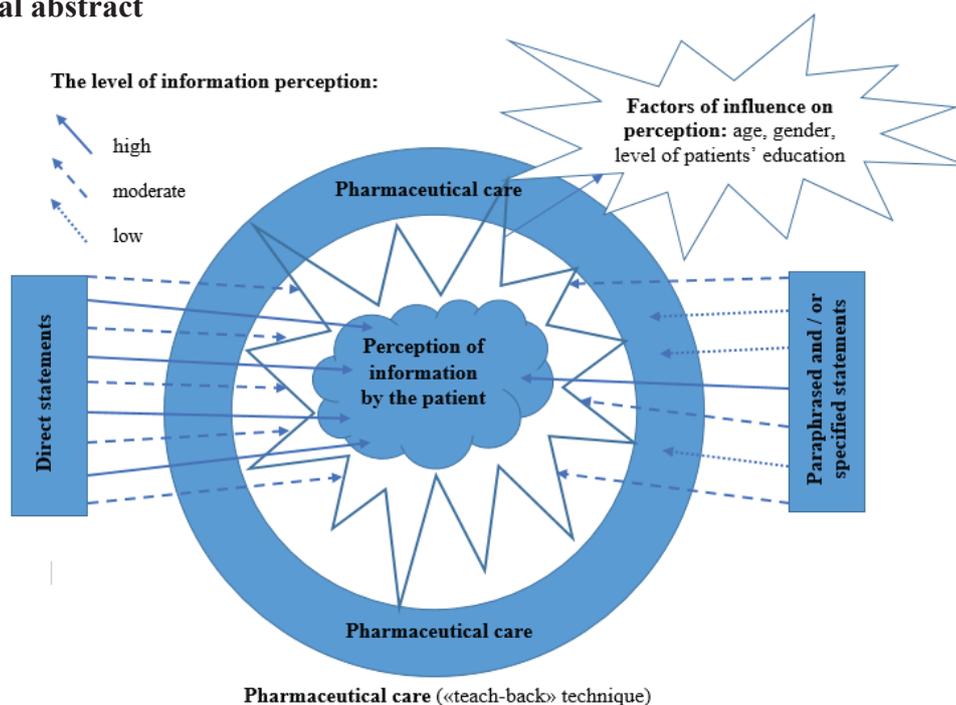
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**Summary:** The «teach-back» method was used on purpose of studying of the level of patient's perception of information about drugs provided through oral pharmaceutical care on the example of NSAIDs. According to the results of our study directly after pharmaceutical care had been provided, the level of perception of information was high concerning 5 statements of the questionnaire (31.2%). Repeated questioning on days 3 and 5-8 did not reveal a statistically significant reduction in the level of knowledge of successfully acquired messages of pharmaceutical care. However, the statistically significant difference in respondents' answers for the paraphrased or specified questions was detected as to 4 messages (50.0% of the information). This indicates efficacy of the method in determining the perception of pharmaceutical care by the patient. Multifactor character of the model of perception of information by the patient shows the need of individualized identification of its level in each particular case.

### Graphical abstract



**Keywords:** pharmaceutical care, perception of information, NSAIDs.

## Introduction

The application of non-steroidal anti-inflammatory drugs (NSAIDs) is common in pharmacotherapy of inflammation, pain, and fever [1]. These drugs represent one of the most frequently used classes of medications worldwide [2,3], despite the mucosal injury of the gastrointestinal (GI) tract, associated with administration of NSAIDs, that is the limiting factor [4,5]. Taking into account the adverse drug reactions (ADRs), NSAIDs need to be used at the lowest therapeutic dose and for the shortest time possible [6]. However, the wide availability of NSAIDs, in particular over the counter (OTC) items, holds the potential for inappropriate use [3] when a significant number of patients believe that OTC drugs are safer than prescription medications [7]. The results of the conducted researches show that NSAIDs belong to drug classes that are the most frequently associated with drug-related problems [8], including ADRs. Yet, about 1/2 of NSAIDs users are unaware of the potential ADRs of these drugs [7]. Thus patient education is a central issue in pharmacotherapy with NSAIDs [9,10,11,12,13], particularly within the pharmaceutical care. The results of the studies carried out in the world show that providing patients with information of good quality that is scientifically grounded has a positive impact on patients' knowledge regarding NSAIDs [12,14]. However, patients' decisions,

particularly on the use of drugs, are based not only on facts but also on emotions, which may prevail [15]. In practice, patients' response, in particular to risks, is influenced by more than just hard facts [15] and, in our opinion, may influence the patient's perception of information about drugs. All of the previously mentioned defined the aim of our research.

The aim of the research: to investigate the degree of patient's perception of information about drugs provided through oral pharmaceutical care on the example of NSAIDs.

## Materials and Methods

Applied methods: system approach, bibliographic, modeling, questionnaire, statistical.

The 1<sup>st</sup> phase of the study lied information of pharmaceutical care messages, like an ideas translated into a form that can be transmitted by spoken words [16], according to appropriate use of NSAIDs as analgesics and antipyretic drugs by the patient within the responsible self-medication (Fig. 1). For this purpose, we chose NSAIDs in solid forms (M01A), that were represented by 5 international nonproprietary names (INN) of drugs and corresponded to 36 trade names from those listed in Ministry of Health of Ukraine Order on medications approved for dispensing from pharmacies without prescription [17] (Table 1).

**Table 1.** OTC NSAIDs [16] (ATC-code – M01A) in solid dosage forms

<b>№</b>	<b>INN</b>	<b>Number of analyzed PILs of trade names of drugs</b>
1.	Ibuprofen	23
2.	Dexibuprofen	6
3.	Mefenamic acid	3
4.	Flurbiprofen	2
5.	Naproxen	2
<b>Total</b>		<b>36</b>

The objects of our study were protocols of pharmacist on dispensing OTC drugs, particularly those containing guidelines on the use of NSAIDs. The pharmaceutical care messages (n = 8) were defined based on the analysis of patient information leaflets (PILs) of chosen NSAIDs (n = 36) [18] and protocols of pharmacist (n = 12) [19].

The questionnaire was created based on pharmaceutical care messages used for investigation of patient's perception of the information

about drugs. The questionnaire contained 16 statements (2 statements for each pharmaceutical care message), which the patient could accept or deny. Some statements of the questionnaire (n = 9) were analogical to the given pharmaceutical care messages, namely a direct question when the correct answer provided patients' consent with the content. Other statements of the questionnaire (n = 7) were paraphrased and / or specified so the correct answer provided patient's denial of the statements.

Phase 1	<b>Formulation of pharmaceutical care (PhC) messages and creation of the questionnaire for the patient</b>		
	Selection and analysis of PILs of NSAIDs in solid drug form allowed for dispensing from the pharmacies without a prescription (OTC) (n=36)	Selection and analysis of protocols of pharmacist which contain the recommendations for the use of NSAIDs (n = 12)	Creation the questionnaire forms on the basis of PhC messages for the study of perception of information about drugs by the patients
	PhC messages (n = 8)		Statements of the questionnaire (n=16)
			Analogous to the PhC messages (n=9)
Phase 2	<b>PhC providing and questionnaire of patients who can use NSAIDs (n = 96)</b>		
	Duration of the 2 <sup>nd</sup> phase of the research: November 2014 – May 2015		
	Providing the oral PhC in accordance with the formulated messages	Questionnaire	
		I – directly after providing the PhC	
		II – on the 3 <sup>rd</sup> day after providing the PhC	
III – on the 5-8 <sup>th</sup> day after providing the PhC			
Phase 3	<b>Analysis of the results</b>		
	Evaluation of patients' answers to the questionnaire		
	Determination of the correlation		
	The share of patients' incorrect answers to the questionnaire	Formulating the statements of the questionnaire	
		Age, gender, level of patients' education	
		Time of the patients' questionnaire after PhC providing	

*Fig. 1. The structure of the conducted research*

The 2<sup>nd</sup> phase of the study was conducted in the period from November 2014 to May 2015.

The oral pharmaceutical care was provided by clinical pharmacist to patients (n = 96), who can take NSAIDs, according to defined messages. The share of female respondents (54.2%) was somewhat prevailing over the proportion of male respondents (45.8%) (Table

2). All patients under research were adults (age between 18-59 years). Whereas older age may be a factor which affects the patients' awareness of NSAIDs [13], we did not include into the study individuals aged 60 and over (n = 4). More than ½ of patients (51.0%) had higher education, 34.4% – upper secondary education and 14.6% – lower secondary education.

**Table 2.** *The characteristics of the patients involved in the study*

The characteristics of the patients	The number of patients	
	Abs.	%
Total	96	100.0
<b>Gender</b>		
Female (F)	52	54.2
Male (M)	44	45.8
<b>Age</b>		
18-35 years	43	44.8
36-59 years	53	55.2
<b>Level of education</b>		
Lower secondary (LS) education	14	14.6
Upper secondary (US) education	33	34.4
Higher (H) education	49	51.0

Directly after the pharmaceutical care had been provided, i.e. before the start of responsible self-medication (I), patients were asked to fill in the questionnaire formed by us according to the single written protocol. The second questioning of patients (II) using the same questionnaire was performed on the 3<sup>rd</sup> day after providing the pharmaceutical care, when, according to the principles of responsible self-medication, the patient could still take the NSAIDs, and on the 5-8<sup>th</sup> day (III) – the investigation of patients' opinion after the completion of responsible self-medication.

The 3<sup>rd</sup> phase of the research included the calculation of incorrect answers (provided by patients when they filled out the questionnaire (Table 3) and the statistical processing of the results. Were established the correlation between

the share of incorrect answers and the wording of the questionnaire statements. The correlation was also defined between incorrect answers and age, gender, and level of respondents' education, the timing of conducting the survey after providing of pharmaceutical care (I – directly after it had been provided, II – on the 3<sup>rd</sup> day, III – on the 5-8<sup>th</sup> day after providing of pharmaceutical care). The dynamics of incorrect answers share and their relation to age, gender and education was studied using appropriate logistic regression models. Logistic regression operates with the notion of odds acting as a dependent variable. Odds are related to the probability (the proportion of correct or wrong answers) by the equation  $O = p / (1 - p)$ , where  $p$  – is probability. Thus, 50% of the correct answers correspond to  $O = 1$ , and 80% –  $O = 4$ . Exponents of the obtained

logistic regression model coefficients are odds ratio and there were interpreted as factors that change the odds of giving the correct or wrong answer. For example, if a certain factor increases probability of the correct answer from 50 to 80%, then, the odds ratio will be 4 (because the odds increase from 1 to 4). We can also say that the presence of this factor increases the odds of giving the correct answer by 4 times. On the other hand, the odds ratio value of 0.2 means a

decrease in the odds of giving the correct answer by  $1 / 0.2 = 5$  times. Statistical analysis and visualization of the results were carried out using R 3.2.3 software.

The level of perception of information provided within the pharmaceutical care was evaluated as high (H) when the share of incorrect answers was less than 10%, moderate (M) – 10-20% and low (L) – 20%.

**Table 3.** The results of a questionnaire survey of patients who may used NSAIDs, after providing them oral pharmaceutical care

№	Pharmaceutical care message (n = 8) Question (statement) of the questionnaire (n = 16)	Questionnaire		
		I	II	III
		Share of incorrect answers – level of perception of information by the patient*		
<b>№1</b>	<b>NSAIDs, as antipyretic drugs, should be used at body temperature of 38°C or higher (body temperature up to 38°C does not require reduction)</b>			
1.1	The use of NSAIDs as antipyretics is appropriate for body temperature above 38°C	12.5% – M	10.4% – M	11.5% – M
1.2	<i>The use of NSAIDs as antipyretics is appropriate for body temperature increased to 37°C**</i>	13.5% – M	16.7% – M	17.7% – M
<b>№2</b>	<b>The use of NSAIDs can lead to lesions of GI tract mucosa: the emergence or exacerbation of gastritis, peptic ulcer, GI bleeding etc.</b>			
2.1	The use of NSAIDs can lead to gastric and / or duodenal peptic ulcer	8.3% – H	8.3% – H	9.4% – H
2.2	The use of NSAIDs can lead to onset of GI bleeding	13.5% – M	15.6% – M	17.7% – M
<b>№3</b>	<b>In order to prevent complications of pharmacotherapy only 1 NSAID should be used, do not combine 2 or more drugs</b>			
3.1	For pain relief or body temperature reduction only 1 NSAID should be taken	12.5% – M	12.5% – M	17.7% – M
3.2	<i>Two different painkillers (NSAIDs) can be used for severe pain</i>	22.9% – L	25.0% – L	26.0% – L
<b>№4</b>	<b>Duration of responsible self-medication with NSAIDs (without doctor's consultation) should last up to 3 days (should not exceed 3 days)</b>			
4.1	During responsible self-medication (without doctor's consultation) the use of NSAIDs should not exceed 3 days	13.5% – M	15.6% – M	16.7% – M

4.2	<i>During responsible self-medication (without doctor's consultation) the use of NSAIDs can last for 6 days</i>	27.1% – L	26.0% – L	31.3% – L
<b>№5</b>	<b>It is necessary to refrain from alcohol consumption during drug use</b>			
5.1	Alcohol consumption during NSAIDs use increases the risk of ADRs manifestation	1.0% – H	3.1% – H	3.1% – H
5.2	<i>The effect of alcohol on the risk of NSAIDs ADRs manifestation is insignificant</i>	14.6% – M	19.8% – M	18.8% – M
<b>№6</b>	<b>NSAIDs should be taken with or after meals, not fasting (not on an «empty stomach»)</b>			
6.1	NSAIDs should be taken with or after meals	11.5% – M	9.4% – H	13.5% – M
6.2	<i>NSAIDs should be taken on an empty stomach</i>	7.3% – H	9.4% – H	15.6% – M
<b>№7</b>	<b>Oral NSAIDs preparations should not be chewed</b>			
7.1	Oral analgesic and antipyretic drugs (NSAIDs) should be taken (swallowed) without chewing	9.4% – H	10.4% – M	12.5% – M
7.2	<i>Chewing of analgesic and antipyretic drugs provides faster onset of NSAIDs effect</i>	24.0% – L	24.0% – L	28.1% – L
<b>№8</b>	<b>Intake of drugs requires drinking ½-1 glass of water (do not take drugs with tea, coffee or other drinks)</b>			
8.1	The analgesic and antipyretic drugs (NSAIDs) should be taken (swallowed), with ½-1 glass of water	1.0% – H	2.1% – H	4.2% – H
8.2	<i>The analgesic and antipyretic drugs (NSAIDs) can be taken (swallowed), with ½-1 glass of tea, coffee, juice or any other drinks</i>	16.7% – M	14.6% – M	18.8% – M

Note: \*The level of information perception provided through pharmaceutical care: high – H (<10% of incorrect answers), moderate – M (10-20% of incorrect answers), low – L (>20% of incorrect answers)

\*\**Italics* marked statements of the questionnaire that were paraphrased messages of pharmaceutical care and / or contained specification

## Results and Discussion

One of the pharmaceutical care messages provided to patients concerned symptoms requiring use of NSAIDs as antipyretic drugs. In spite of provided pharmaceutical care regarding appropriateness of NSAIDs use only in case when body temperature is above 38°C [19], 12.5% of respondents gave answers rejecting this statement of the questionnaire. We also offered respondents the statement about

NSAIDs use for body temperature increased to 37°C, which contradicts good practice of use for these drugs. Some 13.5% respondents made mistakes when agreed to take NSAIDs in such temperature range, that did not differ from the share of mistakes in answers for direct questions ( $\chi^2 = 0$ ,  $p = 1$ ). According to the statistical models of dependence of respondents' answers (message of pharmaceutical care №1) on age, gender, and education, the greatest impact on the

odds to give the correct answer was education (Table 4). Therefore, odds to give the correct answer to a direct question regarding message of pharmaceutical care №1 in patients with lower secondary education was 11 times lower than in individuals with higher education ( $p = 0.0056$ ). As for the paraphrased questions – odds were 6.5 times lower ( $p = 0.035$ ) for the same group of respondents. The answer to the paraphrased question was also significantly influenced by the

gender: men gave wrong answers more often than women (odds ratio 0.08, that corresponds to  $1 / 0.08 \approx 12$  times lower odds of correct answer,  $p = 0.0047$ ). Giving the correct answer to the direct question concerning message of pharmaceutical care №1, men frequently showed false beliefs in responses to the paraphrased question. In addition, respondents of both genders with lower secondary education demonstrated difficulties in perception of this message.

**Table 4.** Specifications of models of logistic regression for the dependence of answers (message of pharmaceutical care №1) on their age, gender, and education

Factor	The use of NSAIDs as antipyretics is appropriate for body temperature above 38°C			<i>The use of NSAIDs as antipyretics is appropriate for body temperature increased to 37°C</i>		
	Coefficient ± standard error	p-value	Odds ratio (exponent factor)	Coefficient ± standard error	p-value	Odds ratio (exponent factor)
Age	-0.01 ± 0.03	0.65	0.98	0.01 ± 0.03	0.77	1.01
Gender (M / F)	-0.83 ± 0.68	0.22	0.43	-2.48 ± 0.88	0.0047	0.08
Education (LS / H)	-2.40 ± 0.87	0.0056	0.09	-1.87 ± 0.89	0.035	0.15
Education (US / H)	-0.74 ± 0.83	0.37	0.47	-0.44 ± 0.77	0.57	0.64

The use of NSAIDs is associated with the risk of ADRs and complications, particularly of the GI, cardiovascular, and renal system etc. [9,20,21,22] a number of which are classified as serious [5,6,9,10,20,22,23]. Upper GI events and symptomatic or complicated ulcers occur in 1 of every 20 NSAIDs users and in 1 of 7 elderly patients using NSAIDs [1]. As many as 25% of chronic NSAIDs users develop peptic ulcer, and

2-4% of them get bleeding or perforation [4]. NSAIDs-related GI events are the most common among all ADRs associated with NSAIDs use and are caused by both prescription (Rx) and OTC NSAIDs [21,24]. Pharmacists most frequently provide patients with counseling on GI complications in comparison to informing about cardiovascular and renal complications [9, 25]. As for the patients, they aver that they want

to receive information about ADRs and risks of drugs use [26,27]. Part of them emphasizes the need to be informed of all possible ADRs, no matter how in frequent they are [27]. Indeed, patients who are well informed about ADRs have a lower risk of experiencing serious ADRs because they react as soon as first symptoms show [10] and are more cautious [14]. However, results of studies conducted in different countries indicate the low awareness among patients about the risks of NSAIDs (the Commonwealth of Australia [11], the Kingdom of Denmark [10], the Kingdom of Thailand [28,29], Malaysia [30], the Republic of Poland [31], the Russian Federation [32], the Slovak Republic [33], the State of Israel [34], the United States of America [7,9]). Poor level of informing patients about potential ADRs by health care providers is among causes of such status quo [7,24,28,33,35]. However, another important issue is the level of awareness and perception of the received information by the patient. Attitude of individuals who are aware of information about possible risks and benefits of treatment differ according to their own experience and emotional factors as they see the possible consequences for themselves differently [15,36,37]. To affirm, 8.3% respondents who took part in our study denied statement that NSAIDs intake can be a cause of stomach and / or duodenal peptic ulcers, and the odds of GI bleeding was rejected by 13.5% of respondents ( $\chi^2 = 0.86$ ,  $p = 0.36$ ) despite the provided pharmaceutical care. According to the statistical models of dependence of answers (message of pharmaceutical care №2) on age, gender, and the level of education, the highest impact belongs to education. However, this impact is weaker than for message of pharmaceutical care №1 and not statistically significant.

Large doses of NSAIDs [5,22,23,38,39] and simultaneous use of more than one NSAID [22,23,38,39,40] are the additional risk factors of GI ADRs, that in particular is induced by the wide availability of drugs of this pharmacotherapeutic group [3,9]. Some patients may overdose the doctors' prescription of NSAIDs or take dosage of an OTC NSAIDs higher than recom-

mended in the leaflet [7,10,20,21,38]. However, patients are more likely to over-use OTC drugs than prescribed NSAIDs [10]. In addition, the problems of concomitant treatment using several NSAIDs arise because of the wide variety of trade names. This makes it difficult for the patient to identify a drug as a certain NSAID [10]. Under such conditions, important is the need to inform health care providers of the fact of NSAIDs use, in particular, the OTC, to reduce the risk of multiple prescriptions of the same or similar medication [28]. Instead, some patients do not inform their doctors about that [10]. Therefore a doctor may not even be aware of a patient's previous medications when prescribing NSAIDs to a patient [39]. A significant part of patients does not consider that use of multiple NSAIDs is a risk factor [28]. Consequently, research results show that use two or more NSAIDs is not a rarity among the wide population [7,11,20]. According to the results of nationwide survey, in the USA 38.0% of patients are simultaneously using both prescription (Rx) and OTC NSAIDs [7]. In Australia, 7.5% of regular NSAIDs users simultaneously use other NSAIDs [11].

Considering these data, for the purpose of preventing complications of pharmacotherapy, we included the message about the permit to use a single NSAID only to pharmaceutical care. Patients were warned about combining two or more drugs of the same effect. However, according to our results, 12.5% of respondents find simultaneous use of 2 NSAIDs acceptable in spite of the provided pharmaceutical care. In case when patients assessed pain as strong, the odds of using 2 different NSAIDs was already supported by 22.9% of respondents. The difference in frequency of errors in the direct and paraphrased questions almost reached statistical significance with  $\chi^2 = 2.90$ ,  $p = 0.089$ . According to the statistical models of dependence of respondents' answers (message of pharmaceutical care №3) on age, gender, and education, the impact of studied factors was weak and statistically insignificant.

When patients use NSAIDs it is import-

ant to provide appropriate warnings on the duration of their administration [20]. Therefore, NSAIDs should be used for the shortest time needed [6] and the duration of treatment using those without consulting a doctor should not exceed 3 days [19]. This information was stated by us as a message of pharmaceutical care but 13.5% of respondents denied it. When we, in spite of provided pharmaceutical care, suggested to the respondents the statement saying that responsible self-treatment with NSAIDs can last 6 days it was supported by as many as 27.1% of respondents. The difference between the mistakes rate in direct and paraphrased questions was statistically significant ( $\chi^2 = 4.63$ ,  $p = 0.031$ ). Therefore, some patients do not consider that long-lasting pharmacotherapy with NSAIDs is the risk factor [10], that can explain our results. According to the statistical models of the dependence of respondents' answers (message of pharmaceutical care №4) on age, gender and education only leveling of recommendations of NSAIDs intake duration by men might be noteworthy. This is reflected in the negative regression coefficient that corresponds to odds ratio 0.33,  $p = 0.085$ . Thus, the odds of male respondents to give the correct answer to a direct question about the message of pharmaceutical care № 4 was three times lower than the corresponding odds for female respondents.

The risk of ADRs of NSAIDs, particularly GI bleeding, is also increased by the simultaneous alcohol consumption [6,41], however, some patients still consume it during pharmacotherapy with this group of drugs [7,31]. Pharmaceutical care provided by us included a recommendation to abstain from alcohol during NSAIDs use. Almost all respondents supported the statement of questionnaire that alcohol consumption during taking drugs of this group increases the risk of ADRs. Incorrect answer was given by only 1.0% of respondents. However, 14.6% of respondents estimated the influence of alcohol as insignificant, which contradicts the results of conducted studies [41]. Thus, the frequency of incorrect answers to paraphrased questions about message of pharmaceutical care

№5 turned to be higher, with statistical significance  $\chi^2 = 10.41$ ,  $p = 0.0013$ . Logistic regression model can not be built, because incorrect answer to a direct question about message of pharmaceutical care №5 was given by only one respondent. Answers to paraphrased questions showed that men (unlike women) and older people (compared to younger respondents) take into less account the effects of alcohol on the risk of ADRs of NSAIDs. Therefore, the odds to provide the correct answer to this question in men is approximately  $1 / 0.38 \approx 2.5$  times less than in women, and in adults 20 years older – in  $1 / 0.95^{20} \approx 2.5$  times less than in younger respondents,  $p$ -values were 0.13 and 0.075, respectively.

A series of pharmaceutical care messages was directly related to the method of NSAIDs administration. In particular, patients were informed that appropriate intake of NSAIDs is during or after a meal because this reduces the risk of GI ADRs [18,29]. However, 11.5% of respondents gave incorrect answers to this question. At the same time, errors concerning statement of NSAIDs intake on an empty stomach were given by only 7.3% of respondents. Therefore, paraphrased statement was formed so that the correct answer predicted its denial by the respondent. It attracted the attention of patients, allowing to slightly reduce the number of wrong answers ( $\chi^2 = 0.55$ ,  $p = 0.46$ ). According to the statistical models of dependence of respondents' answers (message of pharmaceutical care №6) on age, gender and education significant impact on the level of pharmaceutical care perception showed only age of respondents. The odds ratio for the impact of age was 1.06 to both direct and paraphrased questions (Table 5). Accordingly, for people 20 years older, the odds of the correct perception of this message of pharmaceutical care were in  $1.06^{20} \approx 3.21$  times higher than for younger respondents. The statistical significance of this effect has almost reached the critical value:  $p = 0.053$  for a direct question and  $p = 0.16$  for paraphrased one.

**Table 5.** Specifications of models of logistic regression for dependence of answers (message of pharmaceutical care №6) on age, gender, and education

Factor	NSAIDs should be taken with or after meals			NSAIDs should be taken on an empty stomach		
	Coefficient ± standard error	p-value	Odds ratio (exponent factor)	Coefficient ± standard error	p-value	Odds ratio (exponent factor)
Age	0.06 ± 0.03	0.053	1.06	0.06 ± 0.04	0.16	1.06
Gender (M / F)	-0.10 ± 0.67	0.88	0.90	1.51 ± 1.13	0.18	4.51
Education (LS / H)	-0.04 ± 0.95	0.97	0.96	-1.38 ± 1.04	0.18	0.25
Education (US / H)	-0.72 ± 0.77	0.35	0.49	-0.92 ± 1.13	0.41	0.40

In the form of pharmaceutical care, we recommended patients to take NSAIDs without chewing. However, this statement was rejected by 9.4% of respondents. Despite provided pharmaceutical care, the statement about NSAIDs chewing on the assumption of faster achievement of their effect was wrongly supported by 24.0% of respondents. This difference reached statistical significance with  $\chi^2 = 6.34$ ,  $p = 0.012$ . Dependence on age, gender, and education level were not detected. According to the statistical models of dependence of respondents' answers (message of pharmaceutical care №7), factors of age and education had some influence on the level of pharmaceutical care perception only on direct question. Older people and people with higher education were more tend to give incorrect answer to a direct question. However, this statement did not reach statistical significance ( $p = 0.11$  for ages and  $p = 0.062$  for differences between groups with upper secondary education and higher education).

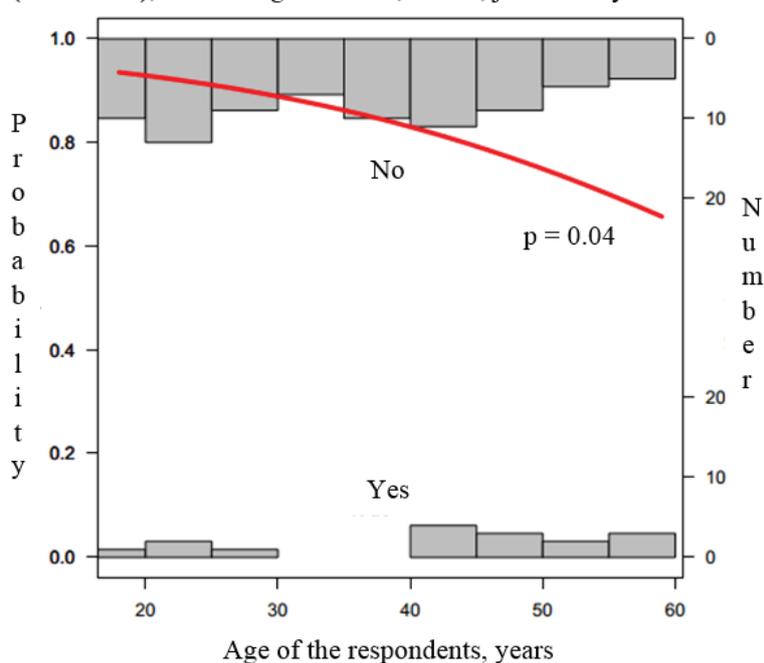
Pharmaceutical care, which was provided to patients, contained the information that NSAIDs should be taken with a ½-1 glass of water. Incorrect answers on this statement of

questionnaire were given only by 1.0% of respondents. However, already 16.7% of respondents gave affirmative answers to question that it is possible to drink tea, coffee, juice or other beverage with NSAIDs. In other words, they made mistakes. Therefore, paraphrased statement of pharmaceutical care showed differences in the received results, which reached statistical significance with  $\chi^2 = 12.65$ ,  $p = 0.00038$ . Whereas only one respondent gave an incorrect answer to a direct question concerning message of pharmaceutical care №8, so in this case, the logistic regression model can not be built. Concerning paraphrased question, older patients and men also were more tend to provide incorrect answers (Table 6). Appropriate statistical significance values are  $p = 0.048$  for age indicator and  $p = 0.067$  for gender. The rate of the effect of these 2 factors is approximately the same, and corresponds to decrease in three times odds: older people had three times lower odds to give the correct answer than respondents 20 years younger (Fig. 2). In addition to this, men had three times lower odds to give the correct answer than women.

**Table 6.** Specifications of models of logistic regression for dependence of answers (message of pharmaceutical care №8) on age, gender, and education

Factor	The analgesic and antipyretic drugs (NSAIDs) should be taken (swallowed), with ½-1 glass of water			The analgesic and antipyretic drugs (NSAIDs) can be taken (swallowed), with ½-1 glass of tea, coffee, juice or any other drinks		
	Coefficient ± standard error	p-value	Odds ratio (exponent factor)	Coefficient ± standard error	p-value	Odds ratio (exponent factor)
Age	-	-	-	-0.05 ± 0.03	0.048	0.95
Gender (M / F)	-	-	-	-1.11 ± 0.61	0.067	0.33
Education (LS / H)	-	-	-	0.87 ± 1.15	0.45	2.38
Education (US / H)	-	-	-	0.27 ± 0.64	0.67	1.31

The analgesic and antipyretic drugs (NSAIDs) can be taken (swallowed), with ½-1 glass of tea, coffee, juice or any other drinks



**Fig. 2.** Model of logistic regression for dependence of answers on paraphrased question on message of pharmaceutical care №8 on age

The issue of communication with patients, in particular on the risks, significantly requires conducting more studies, because this area has a limited knowledge base [15]. Simple

sensitive strategies to determine the level of awareness, understanding of information on health care issues by a patient, such as the «teach-back» technique, when healthcare

professionals ask the patient to repeat the provided information, are rarely used [42]. However, our results show their effectiveness in identifying gaps in patients' knowledge and determining the degree of information perception, including the appropriate use of drugs. According to the results of our study directly after pharmaceutical care had been provided, the level of perception of information about NSAIDs by patients was high concerning 5 statements of the questionnaire (31.2%), and moderate – concerning 8 statements (50.0%). However, in case of 3 statements it was low (18.8%). On paraphrased and / or specified wording the results differed from answers to direct questions was found to 6 messages of pharmaceutical care. In 4 cases the difference reached statistical significance.

The results of several studies show that low level of education is a factor that influences on knowledge, and perception of information by patients [13,29,43]. Our results support this hypothesis: coefficient of regression for the lower secondary compared to higher education for different messages of pharmaceutical care was in the range of -2.4 to +0.87, with a mean value of -0.56, which statistically is significantly less than 0 (one sample Student's T-test,  $t = -2.22$ ,  $p = 0.045$ ). The gender of the patients also plays a role. Therefore, men less tends to listen to advice of pharmaceutical professionals. The corresponding regression coefficients were in the range of -2.48 (statement «*The use of NSAIDs as antipyretics is appropriate for body temperature increased to 37°C*») to +1.51 (statement «*NSAIDs should be taken on an empty stomach*») an average of -0.53 which statistically is significantly less than 0 (one sample Student's T-test,  $t = -2.25$ ,  $p = 0.042$ ).

Repeated questioning on days 3 and 5-8 did not reveal a statistically significant reduction in the level of knowledge of successfully acquired messages of pharmaceutical care. The biggest changes in the results of the survey on day 3 concerned the specified statement: «*The effect of alcohol on the risk of NSAIDs ADRs manifestation is insignificant*». Thus, among 82 respondents who correctly interpreted the

provided pharmaceutical care and denied this statement, 6 persons changed their mind and agreed with it on day 3 (Mc Nemar's test,  $\chi^2 = 2.29$ ,  $p = 0.13$ ). There was no further increase in the number of incorrect answers for this statement, during questioning for 5-8 day 1 respondent, of the 6 mentioned above, has already given the right answer. During the initial survey, 7 people mistakenly agreed with the statement «*NSAIDs should be taken on an empty stomach*». After 3 days incorrect answers were already 9, 5-8 day – 15. Therefore, after 5-8 days number of incorrect answers doubled that almost reached statistical significance (Mc Nemar's test,  $\chi^2 = 3.50$ ,  $p = 0.061$ ). Also, a significant increase in the number of wrong answers was observed to the statement: «*For pain relief or body temperature reduction only 1 NSAID should be taken*». In the I and II surveys, the number of incorrect answers was 12, while in the III (day 5-8 after the pharmaceutical care) this number increased to 17 (Mc Nemar's test,  $\chi^2 = 2.29$ ,  $p = 0.13$ ). It is important to note that the results of the conducted researches show the appropriate level of patients' knowledge during 1 [14], or even 3 [44] months after receiving the information. Taking into account that the duration of NSAIDs use is usually short, these results can be considered positive [14]. Our results are generally consistent with the literature because the perception of any of the messages of pharmaceutical care has not showed statistically significant negative dynamics during 5-8 days.

We also analyzed the distribution by age, gender and education of the respondents who gave the correct answer immediately after the pharmaceutical care. However, they made mistakes after 3 or 5-8 days during the repeated surveys. In most cases, this distribution did not differ from the general sample of respondents in the study (based on construction appropriate models of logistic regression). The level of education had no significant effect on the odds of changing opinion on any of the messages of pharmaceutical care. At the same time, for 3 messages of pharmaceutical care age distribution for those who changed the point of view

is different from the age distribution of the studied population. That is younger respondents were more likely to change their answers to the statements «*The effect of alcohol on the risk of NSAIDs ADRs manifestation is insignificant*» ( $\beta = -0.12 \pm 0.06$ ,  $p = 0.048$ ), «*The use of NSAIDs as antipyretics is appropriate for body temperature increased to 37°C*» ( $\beta = -0.06 \pm 0.04$ ,  $p = 0.086$ ), «*For pain relief or body temperature reduction only 1 NSAID should be taken*» ( $\beta = -0.10 \pm 0.06$ ,  $p = 0.11$ ). Influence of gender was significant for the 3 messages of pharmaceutical care: male thus were more prone to mistakes. This result relates to the statements «*Two different painkillers (NSAIDs) can be used for severe pain*» ( $\beta = 1.96 \pm 0.86$ ,  $p = 0.023$ ), «*Chewing of analgesic and antipyretic drugs provides faster onset of NSAIDs effect*» ( $\beta = 2.09 \pm 1.15$ ,  $p = 0.069$ ), «*For pain relief or body temperature reduction only 1 NSAID should be taken*» ( $\beta = 2.26 \pm 1.40$ ,  $p = 0.11$ ).

### Conclusions

1. During communication with the patient on information about drugs, the use of paraphrased and / or specified statements in comparison to direct wording of pharmaceutical care allowed to identify statistically significant differences in the results on 4 messages of pharmaceutical care. As the findings represent 50.0% of the provided information, it indicates the efficacy of the applied method in determining the perception of pharmaceutical care by a patient.

2. The results of conducted studies showed that for the same amount and format of providing pharmaceutical care about the appropriate use of NSAIDs, there are significant differences in the perception of information by patients. Better perception of pharmaceutical care messages depends on the patient's level of education (higher education vs lower secondary education,  $p = 0.045$ ), his / her gender (females vs males,  $p = 0.042$ ) and, for some certain statements of pharmaceutical care – adult patients' age. Therefore, multifactor character of the model of information perception by a patient and

his ability to change point of view show the need of individualized identification of perception level in each case. In particular, the method of «teach-back», that according to the results of our study is simple and sensitive, should be used in other to determine the degree of perception of pharmaceutical care messages by a patient.

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