

## INFORMATIONAL AND EDUCATIONAL INTERNET APPLICATION, AS A FORM OF PHARMACEUTICAL INTERVENTION IN THE MEDICATION-TAKING BEHAVIOR OF THE APPLICANTS OF HIGHER MEDICAL EDUCATION

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**Introduction.** We have processed a free mobile application "Drug Compatibility Test", aimed at testing the knowledge of drug compatibility, certain aspects of diet and behavioral habits. In our opinion, it is a form of pharmaceutical intervention (PHI), which will prevent the negative consequences of self-medication among users and will help to acquire new knowledge concerning safe use of the most common products of pharmacotherapy (PHT) among the applicants of higher medical education (HME).

Nowadays, health care is increasingly connected with mobile devices and the Internet [10]. There are many medical and pharmaceutical reference tools in the form of so-called mobile applications related with the development of information technologies (IT), which allow to get significant support in making important clinical decisions. However, student youth is actively and irresponsibly engaged in self-treatment, as the results of our previous studies have shown [1, 2]. Moreover, this happens on the background of

practically free access to drugs in pharmacies (both non-prescription and prescription drugs), in fact, the impossibility of targeting many of the IT applications associated with drugs, the reluctance of student youth to learn the correct and safe use of medicines (M) [4, 9]. The above-mentioned defines the aim, tasks and design of this stage of our research.

**Results and Discussion.** Program (P) of "Drug Compatibility Test" is aimed at testing knowledge about compatibility of M and certain aspects of diet and behavioral habits. The design of P is defined as "Quiz", the essence of which is the questioning of the user in the form of text and / or graphical tasks with the choice of answer from several possible options, and then, based on the number of correct answers, the total test result is calculated. The program does not have a well-defined target audience except the age limit "3+", typical for most applications, operating on devices running the operating system of Android and its modifications [7]. The program can be downloaded using the Play Market directly by any user of mobile devices running the operating system of the Android 4.1.0 version (API level 16) or newer, except "smart" watches, televisions and cars. This choice can cover about 98 % of mobile device of ecosystem of Android, including such exotic as devices running MIUI and Kindle Fire e-books, that is approximately 84% of all mobile devices.

It should be noted that P works correctly on large devices such as tablets with screen sizes of 10 inches or more, but the interface looks a bit empty, which, unfortunately, cannot be avoided due to the specific of the task (fig. 1).

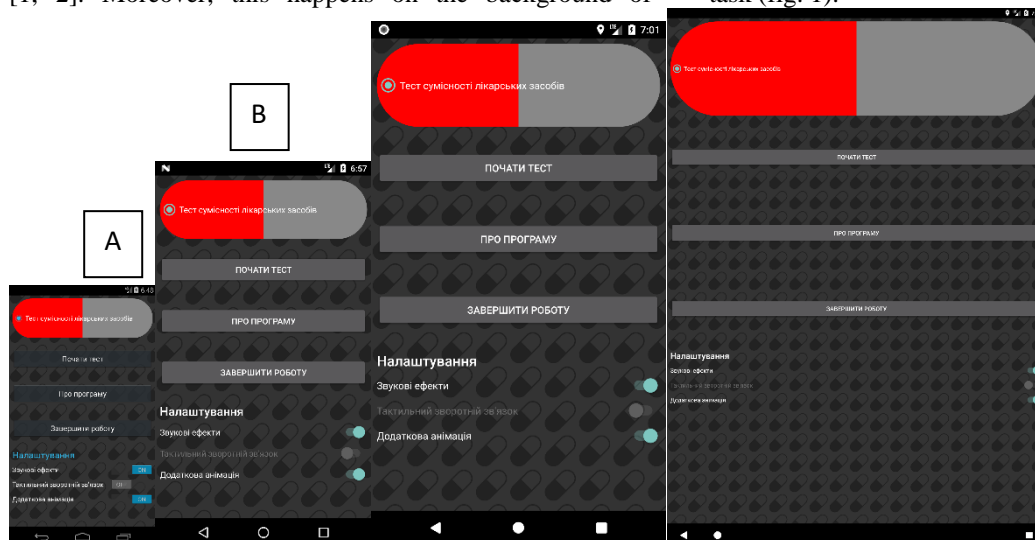


Figure 1. The view of the main window on different devices (scale respected relative to resolution) from left to right: "A" – device with HD display on Android 4.4.x; "B" – device with FHD display on Android 7.x; "C" – modern device with UHD display on Android 8.x; "D" – device with tablet variant of UHD display more than optimized size for Android 8.x.

Therefore, P should be considered optimized for work on smartphones with a screen size from 5 up to 7 inches, which actually has an overwhelming majority of modern smartphones and phablets. Built-in font and distance zooming mechanism (pointing in the Density Independent Points) P makes windows almost independent of the screen resolution, therefore, P looks practically the same on HD (720), on FHD (1080) or on UHD (1440), and even larger,

with slight differences due to different ratios (standard 16:10, 16:9 and 18:9). The rounded edges of the display and newfangled "technological" cut are also provided, which is typical for many devices in particular for Chinese manufacturers. In addition, P does not require a permanent connection to the Internet, because the data is already there. The program does not take up much space (approximately 600 KB), for modern devices it can be considered as practically zero (approximately 1 / 50 000 or even 1 /

200 000 of the total volume of storage for top devices). In some cases, for example, when working in roaming, local storage of data considerably saves costs of users. Besides, if it is necessary the program can be easily localized to any language.

After launching P, the user has a choice of functions: "start testing", "view information about P" and "exit from the P", without making any action by pressing the appropriate button. The sound, haptic effects and additional animation can be turned on and off on the home page. It should be noted that haptic effects are not such in the full sense of the word,

because they are not related to the position of the device in space, but in the P of such appointment, haptic technologies are not used in full. Such partial haptic effects are called reverse tactile connection. On some devices this option may not be available due to the lack of an eccentric in the design. In particular, such a design may have some models of tablet personal computers (PC). A block of 3 switches is responsible for setting up the P, located at the bottom of the window, a stylized image of pill is at the same time the logo of the P in the main window and the mark of the selected option in the window of testing (fig. 2).

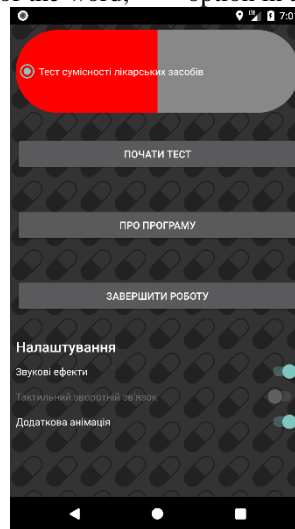


Figure 2 .The main window of the program

The testing is performed by displaying screens with a name and a brief description of M and proposal to choose from four M one compatible or incompatible drug. When the user clicks the "Next" button, P indicates the correctness or

falsity of choice of user with the brief explanation, then goes to the next question. If the user chooses the "Finish" button, P will show if the user answers the question correctly, then P will stop testing and will show the results (fig. 3).

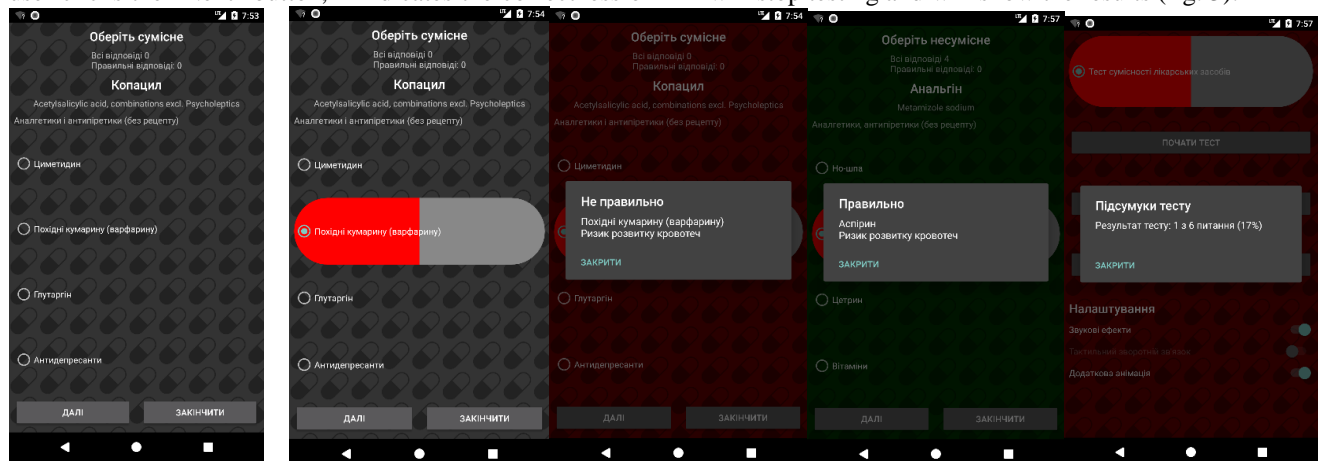


Figure 3. Several windows of P: "question without answer"; "answer"; "message about the wrong answer"; "message about the correct answer"; "message about completion of testing"

The work of P is accompanied by so-called numerical (alpha and timeline) animation effects and transition effects, if the user has turned on them in the system settings. The choice is also emphasized by the sound effect and / or haptic effects, which depends on both the settings of P and the device as a whole. Besides, the data is completely anonymous sent (only the question and answer without any personalization of the name, telephone number, e-mail address, etc.) for further processing and search of the M, knowledge about which is low. The data is sent in small packages using the Google-form. In order to avoid

inconvenience to the user, data may not be sent at all, for example, if the user is working with P outside the country, in places without access to a Wi-Fi network or turns off transfer of data on the device for a long time. Thus, the collected data is stored as a Google Sheets, which is suitable for viewing and even editing directly in the browser, or download converting to formats, suitable for statistical processing.

The main stages of the work continue until the user clicks the "Finish" button. Then the next question is not staged, but instead the results of the testing are displayed, and P again goes into sleep mode for further commands.

The table, which is shown in Figure 4, by the structure and appearance is close to the Microsoft Excel document and contains data for one answer per one line of 5 columns:

	A	B	C	D	E	F
1	Позначка часу	Question	Answer	Compatible	Correct	
2	11.08.2018 15:02:50	Доксициклін	Еутирокс	1	1	
3	11.08.2018 15:02:57	Регулакс	Ібупрофен	1	1	
4	11.08.2018 15:03:03	Стрептоцид	Новокаїн	1	0	
5	11.08.2018 15:03:10	Еутирокс	Орлістат	1	0	
6	11.08.2018 15:03:17	Кальцію глюконат	Глюкокортикостероїди	1	0	
7	11.08.2018 15:03:22	Омепразол	Лідокаїн	1	1	
8	11.08.2018 15:06:00	Екстракт валеріани	Алкоголь	1	0	
9	11.08.2018 15:06:06	Вітрум	Нітрити	1	0	
10	11.08.2018 15:06:08	Лоратадин	Аугментин	1	1	
11	11.08.2018 15:14:02	Амброксол	Кетанов	0	0	
12	11.08.2018 15:15:09	Стрептоцид	Лінкоміцин	1	1	
13	11.08.2018 15:16:04	Екстракт валеріани	Кетанов	1	1	
14	11.08.2018 15:16:09	Сєррата	Німесил	0	0	
15	11.08.2018 15:16:51	Декатилен	Кисла їжа	0	0	
16	11.08.2018 15:17:57	Хартил	Глутаргін	0	0	

Figure 4. Sample of data collected in the test mode of P

Notes: A. Mark of time – in fact, are not statistical data, and sometimes receiving a response, and is not provided by the P, but by the Google server. This column is included, because it is necessary for the work of service.

B. Question – the essence of the question, the name of M, about which the question is asked.

C. Answer – the selected option of the answer.

D. Compatible – the mode of question can have two values: 0 (choose incompatible with the specified) and 1 (choose compatible with the specified).

E. Correct – checking the result may have 2 values: 0 (the false choice was made) and 1 (the right choice was made).

In fact, "0" and "1" are commonly used synonyms ("0" and "1" are counterparts for expression of the Boolean algebra) of the pair "True" and "False", which are operated by the systems of machine data processing. This clarification clearly explains the structure of the data. The use of numeric counterparts allows to process the larger amount of data and slightly saves traffic when collecting data. Such data can be processed practically without changes (except for storing a file in the appropriate format) by Excel and packages of statistical data.

The program is free of charge and free for distribution under any conditions, the payment may only be charged for the transmission of data in accordance with the tariff plans of the mobile operator.

**Conclusions.** 1. We have developed the "Drug Compatibility Test" program in the course of a study which is the complete information application of mobile device, aimed at testing knowledge about the compatibility of medicines and certain aspects of the diet and behavioral habits of the user.

2. The program covers about 84 % of all mobile devices, in particular 98 % of mobile devices of ecosystem of Android. The program is free of charge and free for distribution under any conditions.

3. Base of M, which is included in the Program, formed on the basis of the results of our previous sociological survey about the most used drugs by the applicants of higher medical education. If necessary, the base can be supplemented.

Our further research provides the expert assessment of the attitude of users towards the program, which we have developed. In our opinion, the obtained results will allow to optimize the mobile application (program) and to identify the priorities of student youth in the specified areas of self-medication. The last one will allow us to outline the goals and design of our further researches.

#### INFORMATIONAL AND EDUCATIONAL INTERNET APPLICATION, AS A FORM OF PHARMACEUTICAL INTERVENTION IN THE MEDICATION-TAKING BEHAVIOR OF THE APPLICANTS OF HIGHER MEDICAL EDUCATION Zaremba N., Zimenkovskiy A.

**Aim:** to work out the informational and educational model of pharmaceutical intervention in the medication-taking behavior of the applicants of higher medical education on the basis of modern information technologies to prevent the negative influence of self-medication on their state of health and quality of life. **Materials and Methods.** We have worked out the model of the educational and informative Internet application "Drug Compatibility Test" in the course of working out a new form of pharmaceutical intervention for the applicants of higher medical education regarding the interaction of drugs between themselves. There are used only free publicly available technologies and resources, while developing the Program of "Drug Compatibility Test", namely: Java programming languages (as part of Android Studio 3.2) and VB.NET (as part of Microsoft Visual Studio 2017 Community Edition – free software for individual developers and teams up to 6 participants), markup language of XML (as part of Android

Studio 3.2), own graphic design (Paint.NET graphic editor – free software and programmatic graphics generation) and free, on conditions of attribution (placement of the reference to the source in the program), library of sound effects from the site [www.zapsplat.com](http://www.zapsplat.com). The base of medicines, which are included in this Program, is formed on the basis of the results of the sociological survey on medication-taking behavior of the applicants of higher medical education. This database is formed on the basis of official instructions for medical use of drugs registered in Ukraine dated from October 28, 2018. **Results.** We have developed the Program of "Drug Compatibility Test" in the course of the study, it is the complete information application of mobile device, aimed at testing knowledge about the compatibility of medicines and certain aspects of the diet and behavioral habits of the user. **Conclusions.** 1. The program covers about 84 % of all mobile devices, in particular 98 % of mobile devices of ecosystem of Android 2. The program is free of charge and free for distribution under any conditions. 3. Base of medicines, which is included in the Program, formed on the basis of the results of our previous sociological survey about the most used drugs by the applicants of the higher medical education. If necessary, the base can be supplemented.

**Keywords:** informational and educational program, mobile internet application, pharmaceutical intervention, applicants of higher medical education.

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