Pharmacy Competitiveness Optimization Using Information Technologies

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Abstract: The study is devoted to the development of approaches improving the competitiveness of a pharmacy on the basis of modern information technologies and social-oriented management. This research study presents the results of an experimental study concerning pharmacy patient compliance. A unique information database of medicines was developed. An innovative service for pharmacies, i.e., a mobile service was developed.

Key words: Pharmacy mobile service, information technologies, the competitiveness of pharmacy improvement, patient compliance improvement, pharmaceutical business

INTRODUCTION

The pharmaceutical market of Russian Federation is highly competitive, due to the increase in the number of pharmacy organizations and the expansion of sales. Under these circumstances, pharmacy organizations have to search constantly for effective ways to achieve success, enhance competitiveness through the introduction of new technologies to attract and enhance customer loyalty (Stern and Hammond, 2004; Ryals, 2005).

According to the researchers, the rapid growth of pharmacy number and a high competition, requires modern information technologies for a successful business management.

The development of information technologies and software development allows to automate the pharmacy operation, improve its efficiency and to optimize the process of obtaining some objective, reliable, systematic information on pharmaceuticals (Chaudhry *et al.*, 2006; Krogh and Rough, 2008). The introduction of information technology in the pharmaceutical business provides an increased turnover, the cost reduction during operation and profit increase (Openshaw, 2005).

Currently, Russian pharmaceutical market does not have any innovative automated information products aimed at the optimization of the pharmaceutical organization competitiveness through the provision of innovative services and loyalty programs for customers. Nowadays, it is important to develop the approaches to the optimization of pharmaceutical company competitiveness on the basis of modern information technologies and social-oriented management.

MATERIALS AND METHODS

In order to implement an integrated approach to solve the problems of pharmacy competitiveness optimization, the concept of research was developed that includes three main blocks: an experimental study of pharmaceutical company patient adherence to treatment; the development of a unique information database for drugs; the development of mobile service for pharmaceutical organizations.

RESULTS AND DISCUSSION

Study of pharmacy patients adherence to treatment: During the first stage a sociological study of pharmacy patients adherence to treatment is performed. For this purpose, the profile, the concept that includes the following sets of questions is developed.

- The study of diseased patient behavior aspects
- The assessment of patient compliance using Moriscos-Green universal validated test
- The study of the factors influencing the patient's adherence to therapy
- The evaluation of various technology use reminding about drug intake

The study found that only 16% of patients immediately visit a doctor, > 60% visit a doctor only in extreme cases, when the deterioration of health takes place, 19% go directly to a pharmacy, 4% do nothing.

It was established that the basic information about drugs is received by a patient from a doctor (51%), a pharmaceutical worker (40%) from the instruction to a drug (36%). However, >64% of respondents say they did not receive any advice on taking drugs from a doctor. Thus, 42% of patients are interested in the rules for their application. According to patients, the main causes of information lack at a doctor are the following ones: the lack of time at a reception (52%) and the lack of specialized pharmaceutical knowledge (23%).

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During the study of the adherence evaluation to the treatment of drugstore visitors in Belgorod is performed using a universal validated test Moriscos-Green (4-point scale), according to which the compliant patients are the patients gaining 4 points and noncompliant patients are the patients gaining <3 points.

During data analysis among 200 patients an average value of a compliance indicator is revealed according to Moriscos-Green-1.7 points. It was found that 73% of patients are non-compliant (<2 points), 17% of the surveyed revealed a moderate adherence to treatment (3 points) and only 10% showed high adherence to treatment (4 points).

The study examined the factors influencing the patient's adherence to therapy. It was found that a common mistake that leads to compliance reduction is the modification of the medication regime prescribed by a patient. Thus, patient's reduce the number of medication days (41%), change the time (26%) or a multiplicity of an intake (24%), use other drug (23%) and change the dosage of medication (9%). And only 8% of patients do not alter the course of treatment.

During the analysis, the causes of a medication intake omission are determined: forgetfulness (59%), feeling better (31%), undesirable side effects (30%), the lack of a rapid positive effect (29%).

Also, the peculiarities of various reminding technologies concerning the intake of drugs were studied. It was revealed that most patients do not use reminders at all (60%). The rest make up the schedule of medication intake (16%), ask their relatives to remind about the intake of a drug (11%), set timers in a phone or a watch (10%) use electronic pill boxes (3%).

According to the majority of patients, the most affordable and convenient means of reminding may be a mobile phone with automatic text messages (74%). At that a significant share of respondents supporting for mobile technologies are the pensioners, indicating the availability of these information resources for all age groups. At that patients would like to be reminded via mobile devices about the need to receive a drug (71%), the information about the specifics of drug administration (34%), adverse events (24%) and a course duration (10%). Only 5% of respondents were against the receipt of such information. In this regard, we believe that the development of a reminding system about medication is suitable by the means of mobile devices.

Development of a unique database for medicaments: Based on negative trends and consumer preferences identified through a comprehensive study of Belgorod drugstore patient compliance to treatment, a unique multi-function information database for drugs is developed which includes the following areas: the compliance with a special food regime, the limitation of vital functions and operator opportunities, the interaction of drugs with other preparations, the provision of precautions during the intake of medicines, special means of medication intake, depending on age and health status, pharmaceutical and consumer product characteristics.

Development of pharmacy mobile service: In order to implement an information database for medicinal products via mobile devices, the mobile service of a pharmacy was developed. This is an innovative pharmacy service that will allow to manage the quality of treatment, due to the timely provided, most convenient and important information for a patient about the medication intake; to observe a proper medication regime and improve compliance which will reduce the risk of disease progression and side effects. For a pharmacy this service will allow to increase customer loyalty, improve service quality and service through the provision of innovative services; to increase the competitiveness and image.

Timely informing of patients via mobile devices is carried out in the form of push-notifications that are of three types: notification on your mobile device; automatic calls to patients; SMS-notifications.

The reminders via SMS messages and calls are performed within 10 min before a medicine intake. The remindings are displayed on a full screen on top of all applications, together with a sound notification. Push-notifications contain information from several categories in a short and convenient form for patients:

- The reminding about right medication intake, indicating the quantity, multiplicity and dosage of a drug. After the setting of parameters automatically 5 min before the start of each medicine intake a patient shall receive the information about a medicine intake
- The informing of patients about the peculiarities of a drug intake, taking into account all aspects: peculiarities of a medicine intake, depending on age and health status; compliance with special food regime; the limitation of vital functions and operator opportunities; drug interactions with other medications
- Informing of patients about basic precautions during the intake of drugs (including the interactions with other drugs)
- Informing patients about the main adverse drug reactions in a body

The mobile service is based on a three-tier architecture which consists of a database server, an application server and a client part.

In order to store and process information about medicines a database server is used running under the object-relational PostgreSQL 9.3.6. The maximum volume of the database is limited to the capacity of a data storage medium.

An application server acts as an intermediary between a client and a database server. The application server allows clients to receive updates from a database system. Adding, editing and deletingof information on medicines is performed by the means of an application server.

The system clients are presented by the devices running under the following operating systems: iOS, Android, Windows Phone. The client applications for these operating systems are the native ones. Native applications have a full access to the functionality and the speed of an operating system, do not require a permanent Internet connection and are distributed through branded app stores. A mobile application has a high usability, promptly notify patients about medication intake.

CONCLUSION

After the study of the drugstore patient adherence to treatment an extremely low adherence of Belgorod population to treatment (1.7 points) is revealed. Almost all patients alter a course of therapy: reduce the number of treatment days, the dosage, the time, the multiplicity of drug intake, etc. (92%). At that one of the factors reducing the lack of compliance is the lack of information from a physician about the rules of drugs use, according to the patients, the lack of time during a reception or the lack of specialized pharmaceutical knowledge. Most people go to a doctor only in extreme cases (60%). Besides, the weakening of adherence to treatment is contributed by the omission of medication intake due to forgetfulness (59%). According to the majority of patients, a mobile phone (74%) may be the most affordable and convenient means of reminders and information provision about a medication intake. The >80% of patients would like to receive reminders and information about a specific medication automatically to mobile devices. Including retirees who think this technology is absolutely affordable.

A unique database of drugs is developed to inform patients in the following areas: the compliance with a special food regime; limitation of vital functions and operator opportunities; drug interactions with other preparations; drug intake precautions; special medication conditions, depending on age and health status; pharmaceutical and consumer characteristics of products.

A mobile service for pharmacy organizations is developed. It is an innovative service that allows to manage effectively the quality of treatment, due to the timely provided information, most convenient for a patient and important information about a medication directly on a mobile phone; to observe the correct mode of a drug intake and improve the compliance, thereby reducing the risk of disease progression and side effects. Due to this service a pharmacy may increase a customer loyalty, improve service quality due to the provision of innovative services; improve the image and competitiveness.

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