**Research Article**

# Methodical approach to conducting a multi-aspect matrix analysis of the drug range

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## ABSTRACT

**Aim:** The purpose of our study is to develop a methodology for multi-aspect matrix analysis of the drug range prescribed in outpatient clinics. **Method:** In the process of research, we used such methods as systemic and structural analysis and pharmacoeconomic ones. **Result and Discussion:** The objects of the study were 390 outpatient cards of patients at the age of 7–17 years with ENT diseases; 125 expert questionnaires of otolaryngologists and 50 questionnaires of a sociological survey of parents of patients with ENT diseases; official sources of information: "State Register of Medicines;" "Encyclopedia of Drugs: Register of Medicines in Russia;" "Vidal Reference Book. Drugs in Russia;" Reference book by M.D. Mashkovsky "Drugs;" "Handbook of drug synonyms;" and Price lists of implementation center "Protek" in Kursk (Russia). In this article we propose the original method of a multi-aspect matrix analysis which allows positioning drugs by integrating a significant number of indicators obtained during a pharmacoeconomic study in a multidimensional analytical matrix in order to make a decision on its inclusion in the assortment list for the treatment of a specific nosology. **Conclusion:** We carried out the approbation of the methodical approach and the development of brand portfolios for the treatment of chronic tonsillitis in children. Brand portfolios provide doctors and patients with the opportunity to choose a complex of drugs that meet best the requirements of pharmacotherapeutic efficacy as well as the patient's expectations and economic possibilities.

**KEY WORDS:** Brand portfolio, Chronic tonsillitis, Consumer criteria, Multi-aspect matrix analysis

## INTRODUCTION

Nowadays, it is necessary to involve the patient in the process of pharmacotherapy providing quality outpatient care as it is a patient who is the main participant in this process.[1-3] Hence, it is important to prescribe pharmacotherapy taking into account the patients' individual preferences in the choice of drugs and economic opportunities to buy them.[4,5]

The analysis of scientific and informational materials showed that at present, research on the quality of providing outpatient care to the population is fragmentary and there is no systematic approach to this problem.[6,7] Most pharmacoeconomic methods are not adapted to conducting research in outpatient treatment since they do not take into account the economic characteristics and consuming capacity of patients.[8-10] The current situation requires the development of a methodological approach to the analysis of the drug assortment during pharmacoeconomic research which involves an integrated assessment of a significant number of characteristics.

The purpose of our study is to develop a methodology for multi-aspect matrix analysis of the drug range prescribed in outpatient clinics.

## MATERIALS AND METHODS

In the process of research, we used such methods as systemic and structural analysis and pharmacoeconomic ones. The objects of the study were 390 outpatient cards of patients at the age of 7–17 years with ENT diseases; 125 expert questionnaires of otolaryngologists and 50 questionnaires of a sociological survey of parents of patients with ENT diseases; official sources of information: "State Register of Medicines;" "Encyclopedia of Drugs: Register of Medicines in Russia;" "Vidal Reference Book. Drugs in Russia;" Reference book by M.D. Mashkovsky "Drugs;" "Handbook of drug synonyms;" and Price lists of implementation center "Protek" in Kursk (Russia).

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## RESULTS AND DISCUSSION

The analysis of existing methods of pharmacoeconomic studies (ABC, VEN, and XYZ analyzes) showed that most of them are focused on analyzing the structure of the drug assortment from the economic point of view. In this regard, we consider it relevant to conduct drugs examination not only in terms of their frequency of prescribing and treatment costs but also in terms of their prescribing rationality in outpatient clinics and the degree of compliance with consumer criteria.

To obtain a generalized evaluation of drugs, we proposed an original technique for a multi-aspect matrix analysis of the drug range. This technique is a tool for drug positioning by integrating a significant number of drug indicators in a multidimensional analytical matrix and also for obtaining a generalized assessment of a drug and recommendations for inclusion it in the assortment list for the treatment of a specific nosology in outpatient clinics.

The multi-aspect matrix analysis of the drug range is based on a multidimensional model formed by five pharmacoeconomic indicators of the drug: Pharmacotherapeutic efficacy, degree of compliance with consumer criteria, cost of drugs, costs of a drug treatment course, and frequency of drug administration.

The main advantages of the proposed method are as follows:
1. Facilitation and justification of the drug choice in the formation of assortment lists.
2. Determination of drugs with optimal values for all pharmacoeconomic indicators and as a consequence the best result of an integrated assessment.
3. Development of drug complexes with desired consumer criteria in various price categories.
4. The ability to determine replacement drugs along with the main ones.

The implementation of multi-aspect matrix analysis involves the sequential implementation of four stages: The formation of the drug assortment for the analysis, the construction of a multidimensional matrix, the interpretation of analysis results, and the development of brand portfolios of drugs with specified characteristics.

### 1 Stage

We suppose that the formation of the drug range is reasonable to carry out on the basis of expert analysis by including drugs from different pharmacological groups with high and average values of "weighted mean" ratings.

The group of mandatory drugs (O) with high values of "weighted mean" ratings and absolute compliance with consumer criteria can be represented as the "main" group of drugs. A group of important drugs (I) with average values of "weighted mean" ratings and incomplete compliance with consumer criteria should be considered as replacement drugs which usage is reasonable in the absence or inability to prescribe the main drugs.

### 2 Stage

Then, we constructed the matrix [Figure 1] where the results of the expert analysis are reflected horizontally. The integrated results of the ABC analysis of prescribing frequency and costs of treatment course with the projection of high-cost, medium-cost, and low-cost drugs with high and medium frequencies of prescription are reflected vertically. The degree of drug compliance with consumer criteria is reflected diagonally.

### 3 Stage

Next, we formed seven cells with the corresponding conditional names and certain consumer criteria:
1. The drug efficacy (mandatory and important);
2. The drug cost for a course of treatment (high, medium, and low cost);
3. The drug price (high, medium, and low cost);
4. The novelty degree of the recommended drugs (modern, relatively new, and traditional);
5. The drug production (original/replicated);
6. The possibility of using drugs in outpatient clinics;
7. The usability of the dosage form at home.

Then, in each price category ("Golden," "Silver," and "Bronze"), we determined leading drugs with the highest "weighted mean" ratings and the maximum compliance with consumer criteria ("Leaders"). The remaining drugs with low "weighted mean" ratings and incomplete compliance with consumer criteria fall into the category of replacement ("Followers").

### 4 Stage

Next, we carried out the grouping of drugs from the required groups indicating the main drugs, replacement drugs, and calculating the cost of brand portfolios in three price segments (Golden, Silver, and Bronze). As a rule, the groups "Golden Leader" and "Golden Follower" are presented by drugs with high pharmacotherapeutic efficacy. Furthermore, they are original, expensive, and meet consumer characteristics as much as possible.

In the "Silver Leader" and "Silver Follower" groups, there are drugs with high pharmacotherapeutic efficacy, original and replicated medications, medium cost, with medium or low cost, and meeting consumer criteria partially or completely.

The groups "Bronze Leader" and "Bronze Follower" are represented by drugs with high pharmacotherapeutic

effectiveness, generics, with low cost, and with a low degree of compliance with consumer criteria.

Thus, according to the results of a multi-aspect matrix analysis, the formed brand portfolios of drugs have high pharmacotherapeutic efficacy taking into account various costs and consumer characteristics: Duration of treatment, the usability of the dosage form at home, degree of the drug novelty, etc.

We conducted testing of multi-aspect matrix analysis on the example of chronic tonsillitis in children as one of the most common forms of diseases in pediatrics.

In accordance with the methodical approach to conducting a multi-aspect matrix analysis which is based on the results of ABC and expert analyzes in view of consumer preferences, we carried out the

| Degree of compliance with consumer criteria | | Results of expert analysis | |
|---|---|---|---|
| | | **Mandatory drugs (Group «O») Leaders** | **Important drugs (Group «I») Followers** |
| Results of integrated ABC and frequency analyses | The group of high-cost drugs with high and medium frequency of prescription Gold | High and medium frequency of prescription High cost Mainly modern Mainly original Positively proven in pediatric use Mainly convenient dosage form High-cost drugs | High and medium frequency of prescription High cost Mainly modern Mainly replicated Having restrictions in pediatric use Relatively convenient dosage form High-/medium-cost drugs |
| | The group of medium-cost drugs with high and medium frequency of prescription Silver | High and medium frequency of prescription Medium cost Mainly new Mainly original Positively proven in pediatric use Mainly convenient dosage form Medium-cost drugs | High and medium frequency of prescription Medium cost Mainly new Mainly replicated Having restrictions in pediatric use Relatively convenient dosage form Medium-/low-cost drugs |
| | The group of low-cost drugs with high and medium frequency of prescription Bronze | High and medium frequency of prescription Low cost Mainly traditional Original/replicated Positively proven in pediatric use Mainly convenient dosage form Low-cost drugs | High and medium frequency of prescription Low cost Mainly traditional Original/replicated Having restrictions in pediatric use Relatively convenient dosage form Low-cost drugs |

**Figure 1:** The matrix of a multi-aspect matrix method for analyzing the drug range and the interpretation of its results

| Degree of compliance with consumer criteria | | Results of expert analysis | |
|---|---|---|---|
| | | **Basic drugs Group "O" Leaders** | **Replacement drugs Group "I" Followers** |
| Results of integrated ABC- and frequency analyses | The group of high-cost drugs with high and medium frequency of prescription Gold | Tonsilgon N (drops), Multi-tabs, Immuno Plus | Bioparox, Tonsilotren, Lysobact, Centrum |
| | The group of medium-cost drugs with high and medium frequency of prescription Silver | Tonsilgon N (pills), Multi-tabs Junior* | Hexaspray, Hexalyse, Picovit Plus, Alphavit for kids, Complivit |
| | The group of low-cost drugs with high and medium frequency of prescription Bronze | Faringosept, Jungle | Inhalypt, Strepsils, Revit, Ascorutin |

**Figure 2:** The multidimensional matrix of a multi-aspect analysis of the drug assortment list for the treatment of compensated chronic tonsillitis in children in outpatient clinics

formation of brand portfolios for the treatment of chronic tonsillitis in children.

Initially, we did the formation of the drug assortment list for chronic tonsillitis with various forms of severity according to the groups of drugs obtained during expert analysis. Thus, the main drug list for the treatment of compensated chronic tonsillitis is formed by 13 mandatory drugs ("O") with high "weighted mean" ratings (from 1.5 to 1.7); important drugs ("I") in the amount of four items with low "weighted mean" ratings (from 1.2 to 1.4).

Then, we constructed a multidimensional matrix filled and introduced by drugs in accordance with the results of expert analysis, the integrated results of the ABC analysis concerning the frequency of prescription and costs of treatment and the degree of the drug compliance with consumer criteria [Figure 2].

At the next stage in accordance with the ATC classification, we identified leaders in each price group of drugs that received the highest "weighted mean" ratings with the maximum compliance with consumer criteria. These drugs are subsequently presented as the main drugs. The rest drugs with low values of "weighted mean" ratings and incomplete compliance with consumer criteria are included in the substitution category.

At the final stage, we classified drugs from the necessary pharmacological groups, indicating the main drugs, replacement drugs, and calculating the cost of brand portfolios in three price segments ("Golden," "Silver," and "Bronze") to treat various forms of chronic tonsillitis.

In particular, the group "Golden Leader" for the treatment of compensated chronic tonsillitis is formed by two drugs (drops Tonsilgon N and tab. Multi-tabs Immuno Plus) with high "weighted mean" ratings, high pharmacotherapeutic efficacy, expensive, with maximum compliance with consumer characteristics and recommended for mandatory inclusion in the brand portfolio as main drugs.

## CONCLUSION

Thus, we made progress in the formation of three brand portfolios of drugs for the treatment of compensated chronic tonsillitis of various price categories (more than 500 rubles, from 200 to 500 rubles, and <200 rubles). Hence, pharmacotherapeutic complex

No 1 for the treatment of chronic compensated tonsillitis with an average price of the treatment course is about 700 rubles and is formed by such modern drugs as Tonsilgon N (drops), Bioparox, Tonsilotren, Lysobact, Multi-tabs Immuno Plus, and Centrum. The indicated complex of drugs has a high therapeutic efficacy and drugs are presented in convenient dosage forms for children: Drops, tablets, and aerosol that are possible to use by young children. The main side effect is allergy.

Hence, we made a multi-aspect matrix analysis. The result is the formation of drug brand portfolios for the treatment of compensated chronic tonsillitis. These brand portfolios are optimal from the viewpoint of pharmacotherapeutic, economic, and consumer criteria. The drug brand portfolios give an opportunity to doctors and patients to choose a complex of drugs that meet best the requirements of pharmacotherapeutic efficacy, as well as the expectations and purchasing power of patients.

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