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GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

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EXPENDITURE ON MEDICINES IN A MULTIDISCIPLINARY HOSPITAL IN ALMATY
BASED ON ABC /VEN ANALYSIS

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Abstract.
One of the main problems in modern pharmacotherapy is the irrational use of medicines. An essential role in this practice is played by the unjustified prescribing of antibiotics in medical organizations (MO), both in polyclinics and in hospitals.

Medicines that are not included in the list of the Kazakhstan National Formulary (KNF), which increases the cost of Medicines (M) in the Medical Organization (MO), play a very important role.

Pharmacoeconomics is a science that compares the costs of medicines and their effectiveness when choosing a treatment tactic for a patient. It helps to determine the best use of budgetary funds.

Currently, the question of the rational use of medicines in practical healthcare is being raised, using the methods of pharmacoeconomical analysis (FEA). Research in this field is important for the patient, the state, and also for the pharmaceutical market.

Due to the increasing need of the state to assess the effectiveness of the budget spent on various methods of treatment, the demand for conducting pharmaceutical research in Kazakhstan is increasing.

This article demonstrates a retrospective research method for evaluating expenditure on medicines using ABC /VEN analysis.

Key words. Pharmacoeconomics, ABC/VEN analysis, antibacterial medicines, wasteful medicines.

Introduction.
With the advent of new drugs on the market, the need to determine the relationship between the cost and effectiveness of the drug has increased. The issue of the efficiency of spending budget funds of the Ministry of Defense, conducting pharmacoeconomical research has become important. The objectives of MO inventory control were: 1) improving the rational approach when choosing medicines, taking into account both international and national recommendations (KNF); 2) reducing the cost of funds of secondary importance; with priority on the stock of vital medicines with a high level of sales.

Ranking according to the ABC system ("Always Better Control") ABC is used to study the structure of medical care costs and determine the most expensive drugs that "eating up" a significant share of the budget. Since the control of the most expensive drugs should bring the greatest contribution to the management of expenses in general.

VEN analysis allows you to assess the expediency of spending resources by dividing all the medicines into three categories: V (from vital), E (essential), N (non-essential)

The classification criteria of VEN determined after a discussion with the team of health professions at the hospital, which are clinical pharmacologists, senior pharmacists, and a senior physician, also taking into account the KNF(Kazakhstan National Formulary).

As a result of the final analysis of the combination of ABC and VEN analyses, each group "A", "B" and "C" is divided into categories V, E and N. The absence of category N among group A is considered the most acceptable, which makes it possible to assess the loss of MO on drugs without proven effectiveness.

Control measures for drugs of secondary importance in the Clinical Hospital in Almaty led to savings with a difference of 2 million Kazakh tenge. Of all the inventory control systems, ABC and VED matrix are the most suitable for MO [1-10].

Goal. Optimizing the rationality and validity of medicines prescriptions in a multidisciplinary hospital in Almaty.

Research objectives. To study the use of medicines in a hospital using ABC / VEN analysis.

The study was conducted in 2 stages. In Stage 1 of the process, we will calculate the total amount of medicine consumed in the first half of 2021. We will then use this information to determine the cumulative percentage of each source material based on the ABC system for expenditure on medicines. Finally, we will allocate medicines by priority according to the VEN analysis. By completing these steps, we can better understand and manage our medicine inventory for the remainder of the year. A comparison was made to see how much total expenditure changed by 2022.

Materials and methods.

ABC analysis is a method of management accounting that allows you to determine the main costs of providing medicines. The method is based on the Pareto principle, known as the «20 to 80» rule: 20% of the factors determine 80% of the success. In this case, the technique should significantly reduce both the cost of non-reasonable prescribing by doctors and the cost of the hospital as a whole.

To conduct the ABC analysis, it was necessary to divide medicines into three classes according to the level of costs: «A» — the most expensive medicines, for which 80% of the costs are spent, «B» — less expensive, for which 15% of the costs are spent, «C» — the least expensive (5% of the costs). To rank in ABC groups, it is required to determine a cumulative percentage equal to % of the total amount for a particular technology. As a result, the amount of costs for the ABC group is determined and appropriate measures are taken to improve the use of medicines, with the involvement of the administration of the MO.

For reliable pharmacological supervision, a VEN analysis is used together to determine the rationality of spending MO resources, by dividing the medicines or products used into categories: V (or vital), E (essential), N (non-essential). ABC -the analysis was carried out for international non-proprietary names (INN). The total number of medicines analyses (Table 1) was 403 (2021), of which 55 medicines (13.6%) were included in group «A», 85 medicines (21.1%)...
in group «B» and 263 medicines (65.5%) in group «C». The total expenditure on medicines in the analysed list (Table 2) was 405,944,532.30 Kazakh tenge. The three most expensive medicines were in group «A»: Hepasan (Sodium Heparin) 5000ED 5ml, Catenox 4000 anti-Ha / 0.4ml (Sodium Enoxiparin), Albunorm 20% 100 ml (Human Albumin), which amounted to 24,418,356 Kazakh tenge. Group «B» included medicines such as: Arduan 4mg (Pipercuronium bromide), Isotory 250 ml (Isoflurane), Fentanyl 0.005%-2ml, for which the hospital spent 4,073,599.26 Kazakh tenge. The cheapest group «C» included Mannitol 15% 200ml, Potassium Chloride Solution extemporal 7.45% - 200ml, Aminocaproic acid 5% 100.0, Glucose 10% 200 ml, Dexmedetomidine 100 mcg/ml 2 ml. for these medicines 1,171,803.86 Kazakh tenge was spent.

In 2022, the number of medicines used was 385. Group A included 56 medicines, of which the most expensive: Darzalex concentrate.to prepare an infusion solution (Daratumumab), Velkzomib 3.5 mg (Bortezomib), 200 ml, Vigexol (Yogexol) 300mg of iodine / ml, which is 90,412,422.3 Kazakh tenge. In the group of «B» 82 medicines: in the top three were Jakavi 15 mg (Ruxolitinib), Actemra 200 mg /10 ml 10 ml (Tocilizumab), Propofol-Lipuro 1% 10mg / ml 50ml. Group «C» covered 244 medicines. The three expensive medicines of group «C» included: Magnesium sulfate 25% 5 ml, extemporaneous solution of potassium chloride 7.45% - 200ml, RinGlar 100ED / ml, 3.0 ml each (Insulin Glargine).

### Results.

Analyzing this table, we can say that there is no significant difference in costs. The VEN analysis was carried out based on the recommendations of the World Health Organization (WHO) and the Kazakhstan National Formulary. The medicines used in this MO were divided into three groups (Table 1): Vital (Vital, V), Essential (Essential, E), Secondary (Non-essential, N).

In 2021, the number of medicines in group V was: 114, of which from group «A»: 19 (16.7%), from group «B»: 25 (21.9%), from group «C»: 70 (61.4%); Group «E» -243 of them: «A»: 34 (14%), «В»: 48 (20.6%); «C»: 161 (65.4%); Group N made up 403 medicines of which: Group «A»: 3 (8.3%), Group «B»: 8 (19.4%), Group «C»: 20 (72.3%).

### ABC-VEN matrix analysis.

The table shows the results of the ABC-VEN -matrix analysis. The ABC-VEN matrix reclassifies items based on the results of the ABC and VEN analyses. In the ABC-VEN matrix analysis, there are nine different subcategories (AV, BV, CV, AE, AN, BE, CE, BN, and CN), which in turn are grouped into three main categories, namely categories I, II, and III [7].

The medications [tab 5,6] in the I st category (127-150 items) were discovered to be necessary or costly. Their inventory level had a significant impact on the entire cost, thus they needed to be constantly monitored. The II-nd group (221-225 items) is made up of necessities. These medications were not as critical as the first group, but they required substantial management. The medications in Category III (20-32 products) are both inexpensive and desired. These medications should be obtained on a regular basis and given the lowest priority.

### Discussion.

In order to implement a rational and economically justified prescription of medicines, we conducted a pharmacoeconomical analysis based on ABC-VEN analysis. Table No. 2 shows the consumption of drugs for the 2 half-years of 2021 and 2022, amounting to 405,944,532.30 Kazakh tenge for 2021 and 398,653,456.27 Kazakh tenge for 2022. At the same time, it should be noted that the clinical pharmacologist began working on a regular basis and given the lowest priority.
The analysis of consumption for 2021 revealed the irrational use of drugs for group N drugs, amounting to 11.4%. A similar situation was observed in 2022. But with dynamics with a decrease of 3.2%. The total consumption of drugs from group N for 2021 amounted to 14,416,712.7 Kazakh tenge (Figure 1), for 2022 12,098,375,83Kazakh tenge (Figure 2). With a difference of 2,318,336.87 million Kazakh tenge. It should also be noted that many drugs from the list of residues for 2021 were included in the list of the material statement for 2022.

Among the frequently prescribed and expendable antibiotics included: Meropenem, Ceftriaxone and Metranidazole. The list of expensive drugs includes radioconstrictive, anticoagulant, immunological drugs, and infusion solutions of 0.9% NaCl. ABC analysis showed similar results in Dessie Referral Hospital, Ethiopia [10]: antibiotics like ceftriaxone(CEF III) 1 g injection: fluids like sodium chloride 0.9% solution were located in a group (A).

The increase in the cost of saline solutions can be explained by the purchase and use of 0.9% NaCl in 200 ml, when in practice doctors often prescribe 100 ml. As a result, half of the solution could not be used, pouring out.

Based on this, measures should be taken to reduce unreasonable prescriptions and improve applications for the purchase of medicines, using the example of saline solution. After all, if we take into account the purchase of half of the saline solution in 100 ml, it could significantly save the state budget with a difference of 13 million Kazakh tenge for 2021 and 10 million Kazakh tenge for 2022. Thus, not only reduce unreasonable costs, but also take measures to use drugs with a more reliable evidence base.

Overall, 78 medication products (from 2021-2022) that fall into the subgroups of AV, AE, and BV of category I are included due to their necessary or vital character. These items should be in stock. Therefore, any medicine deficit in this category must be removed [6].

3-2 medication products (from 2021-2022) that make up subgroup AN must be regulated for economic order quality before being ordered. And should also be carefully examined before placing the order.

The items in category II (54.8%-61.5% of all items from 2021-2022) are not expensive or vital as I category, so, this group needs to be controlled periodically [7] and could be ordered once or twice a year without affecting patient care.

The category III (5.23-7.94% of all items from 2021-2022) consist sub-category namely, CN. These are the least necessary and affordable products in this group. This group does not need to be controlled periodically.

Our research detected:
1) prescribing antibiotics of the same group (Beta-lactam): Piperacillin Tazobactam + Meropenem, Ceftriaxone+Meropenem
2) appointment of unprotected antibiotics after protected ones: Amoxicillin after Amoxiclav.
3) the appointment is not on the spectrum of action:The appointment of Amikacin (Gram-+) Gram+
4) the wrong combination of antibiotics: Amikacin+Vancomycin
5) prescribing antibiotics immediately from the Reserve group, instead of from the Access, Watch group
Pathogens such as Pseudomonas aeruginosa, Enterobacteriaceae (E.coli, Klebsiella pneumonia, Enterobacter spp) have proven resistant to many antibacterial drugs.

Of those sensitive to antibacterial therapy, only Colistin (Polymyxin) turned out to be, which was not in the MO's Medical Formulary.

We offered to purchase this drug, after which an improvement was noted and later included in the Medical Formulary.

Conclusion.
During this ABC/VEN analysis, we could answer three important questions:

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Conclusion.
During this ABC/VEN analysis, we could answer three important questions:
1. How are funds for medicines spent in the Ministry of Defence? (mainly on which medicines from the ABC and VEN group).

2. What measures should be taken to rationalize medicine procurement?

3. Which medicines should be considered first (for inclusion/exclusion)?

This method indicates a positive response to measures to improve the quality of treatment and the rationality of prescribed medicines, helping to make treatment more effective, safe and economically justified. [1]

A comparison analysis between ABC and VEN (Vital, Essential, and Non-Essential) methods was conducted in a multidisciplinary hospital. The results showed that the efficient and rational use of medications improved during the period of six months in 2021-2022. This success was due to RILS activities that involved the provision of training seminars to healthcare professionals.

To date, resistance to antibacterial drugs is growing. Every day there are infections that cannot be treated and aggravate the already difficult situation in the world with the growth of resistance.

In addition, improper prescribing of antibiotics and improper dosing, improper use of antibiotics, the choice of antibiotics of a wider spectrum of action worsen the already existing problem in the world with an increase in mortality.

Our study revealed the irrational prescription of antibiotics such as: prescribing antibiotics of the same, appointment of unprotected antibiotics after protected ones, the wrong combination of antibiotics, prescribing antibiotics immediately from the Reserve group, instead of from the Access, Watch group.

To reduce the growth of resistance and increase the use of safer and more effective use of antibiotics in the conditions of the MO, the following work to improve and accelerate measures to combat the resistance of this MO, we propose to conduct an analysis on the validity of the use of antibacterial agents based on the classification of AWARE.

REFERENCES


