IOSR Journal Of Pharmacy *www.iosrphr.org*
(e)-ISSN: 2250-3013, (p)-ISSN: 2319-4219
Volume 7, Issue 5 Version. 1 (May 2017), PP. 24-27

The study of "budget impact" of antiglaucoma medicines, recommended for inclusion in formulary and insurance lists

Makarenko O. V.[1], Kryvoviaz O. V.[2], Kryvoviaz S. O.[3]
[1] *Department Of Social Medicine, Organization And Health Management, State Establishment "Dnipropetrovsk Medical Academy Of Health Ministry Of Ukraine", Dnipro, Ukraine*
[2] *Pharmacy department, National Pyrogov memorial medical university, Vinnytsia, Ukraine*
[3] *Eye diseases department, National Pyrogov memorial medical university, Vinnytsia, Ukraine*

Abstract: As a pathology that requires lifelong treatment, primary open-angle glaucoma (POAG) causes significant increase in direct (pharmacotherapy) and indirect costs (associated with partial or complete disability of patients with POAG). The work presents the results of pharmacoeconomic "budget impact" analysis of antiglaucoma medicines (AGMs), recommended for inclusion in the formulary (FL) and insurance (IL) lists of pharmaceutical servicing patients with POAG on the basis of results obtained from previous studies. The "budget impact" analysis is an important part of integrated pharmacoeconomic evaluation of the health care system with the results needed by public funding bodies, namely for compensation of costs for pharmacotherapy to patients and approval of documents for refunding. The results of pharmacoeconomic study of POAG treatment with medications, recommended for inclusion in FL and IL, allowed to indicate the POAG treatment regimens, which help not only save costs in context of perspective of budget impact, but also provide significant advantage in achievement of target intraocular pressure (IOP) (characterized by the lowest "cost-efficacy" rate); POAG pharmacotherapy regimens is considered cost-effective, which, requiring additional costs nevertheless provides greater efficacy in lowering IOP; dominant schemes, switching to which requires additional costs.
Keywords – primary open-angle glaucoma, antiglaucoma medicines, study of "budget impact", formulary and insurance lists.

I. Introduction

The expedience of overall pharmacoeconomic analysis of primary open-angle glaucoma (POAG) treatment is preconditioned by epidemiological indicators, which clearly indicate growing morbidity and disability caused by the disease, as well as its social, medical, and economic importance for both patients` and the national budget [1–4].

It`s well known, that POAG is characterized by abnormally high intraocular pressure (IOP), associated with hyperproduction or impaired aqueous humor outflow from the eye, which, in turn, leads to disturbance of visual function, and, if untreated, may lead to complete loss of vision. According to WHO, POAG is one of the primary causes of disability in sight. Prevalence and incidence of glaucoma is increasing every year in the world and in Ukraine. In addition to negative impact on patients` health, partial or complete loss of vision causes significant reduction in quality of life [5,6].

As a pathology that requires lifelong treatment, POAG causes significant increase in direct (pharmacotherapy) and indirect costs (associated with partial or complete disability of patients with POAG). If AGMs are purchased at patients` expense, direct costs for POAG pharmacotherapy cause substantial costs to patients and their families. In that case, the choice of AGMs may be driven mostly by price rather than a real need for them, or the necessity to comply with doctor's prescriptions. Moreover, the pharmacy is not able to provide the whole range of medicines of group S01E "Antiglaucoma preparations and miotics." In this regard, the work presents the results of pharmacoeconomic "budget impact" analysis of AGMs, recommended for inclusion in the formulary (FL) and insurance (IL) lists of pharmaceutical servicing patients with POAG on the basis of results obtained from previous studies [7,8].

Therefore, all above-mentioned facts testify the topicality of optimizing medical and pharmaceutical care for patients with POAG under results of pharmacoeconomic survey of (AGM) antiglaucoma regimens prescribed by ophthalmologists in Ukraine.

Apparently, the "budget impact" analysis is an important part of integrated pharmacoeconomic evaluation of the health care system with the results needed by public funding bodies, namely for compensation of costs for pharmacotherapy to patients and approval of documents for refunding. [9]

II. The Purpose of The Work

The objective of the study was assessment of "budget impact" of alternative POAG treatment regimens, recommended for inclusion in the formulary (FL) and insurance (IL) lists, by "cost-effectiveness" method with due regard to the data obtained from previous studies.

III. Materials And Study Methods

Pharmacoeconomic analysis performed using the "budget impact" principle allows to assess influence of studied medical technique (pharmacotherapy methods) on the health care budget of Ukraine. The "budget impact" is assessed taking into account the economic effect (savings), spent on a particular treatment regimens. The "budget impact" analysis is a comparative one, since it is based on assessment of difference in economic benefits of evaluated treatment regimens, expressed in monetary terms.
The result of "budget impact" analysis has been calculated under formula 1:

BIA = Efec (1) – Efec (2), (1)

where BIA – the result of "budget impact" analysis, UAH;
Efec (1) – overall economic effect of comparator treatment regimen, UAH;
Efec (2) – overall economic effect of alternative treatment regimen, UAH [10].
Taking into account different AGM regimens, we used for calculations the cost of DDD/1 patient/year, UAH, calculated on the basis the data obtained from previous studies [11].
For that purpose, using this technique allows us to calculate the savings or the need for additional costs in case of replacing one regimen with another.
Therefore, we have calculated indices for finding POAG treatment regimens, by switching to which patients can save money, and identifying those that require additional costs for patients against the comparator regimen.

IV. Results And Discussions

"Budget impact" analysis considers only economic effect of using comparative treatment regimens, despite the therapeutic efficacy of certain AGMs, assessed in terms of lowering IOP (%) [12].
It is, therefore, advisable to compare the "budget impact" analysis data with the results of pharmacoeconomic "cost - efficacy" study in order to make possible the comparative assessment of not solely economic benefits, but also pharmacotherapeutic efficacy of different POAG treatment regimens (Table 1).

Table 1: Results of the "budget impact" analysis, counting on "cost-efficacy" index

Composition of comparator regimen	Composition of study regimen	"Budget impact" analysis (BIA), UAH	Δ CER
Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	-1208.44	-6.124988
	Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium)	-1689.37	-6.459630
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-1289.47	-2.631650
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/m,l 2.5 ml No. 1, VAT "Farmak" (Ukraine)	-2357.17	-4.689860
	Azopt Eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-2411.04	-4.854491
Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	1208.44	6.124988
	Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium)	-480.93	-0.33464
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-81.03	3.493338
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	-542.25	2.869602
	Azopt Eye drops, 10 mg/ml , 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml, No. 1 Santen (Finland)	-1202.60	1.270497
Travatan eye drops, 40 µg/ml, 2.5 ml in drop	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	1689.37	6.459625

dispenser No. 1, Alcon-Couvreur (Belgium)	Lanotan eye drops 0.05 mg/ml, 2.5 ml, No. 1 VAT "Farmak" (Ukraine)	480.93	0.334637
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	399.90	3.827975
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	-61.32	3.204239
	Azopt Eye drops, 10 mg/ml , 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-721.67	1.605134
Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	1289.47	2.631650
	Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	81.03	-3.493340
	Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium)	-399.90	-3.827980
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	-461.22	-0.623736
	Azopt Eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-1121.57	-2.222841
Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	-2357.17	-4.689860
	Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	542.25	-2.869600
	Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium)	61.32	-3.204240
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	461.22	0.623736
	Azopt Eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	-660.35	-1,599105.
Azopt eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany)	2411.04	4.854491
	Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine)	1202.60	-1.270500
	Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium)	721.67	-1.605130
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland)	1121.57	2.222841
	Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1 VAT, "Farmak" (Ukraine)	660.35	1.599105

The results of pharmacoeconomic study of POAG treatment with medications, recommended for inclusion in FL and IL, indicate the following POAG treatment regimens, which help not only save costs in context of perspective of budget impact, but also provide significant advantage in achievement of target IOP (characterized by the lowest "cost-efficacy" rate):

- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) compared to Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine);
- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) compared to Travatan eye drops, 40 µg/ml , 2.5 ml in drop dispenser No. 1 Alcon-Couvreur (Belgium);
- Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) compared to Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium);
- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) compared to Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium);
- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) compared to Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1 VAT, "Farmak" (Ukraine).

Switching from below-mentioned POAG pharmacotherapy regimens is considered cost-effective, which, requiring additional costs nevertheless provides greater efficacy in lowering IOP:

- from Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) to Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) or Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) or Azopt eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland);
- from Arutimol eye drops 0.5%, 5 ml Chauvin ankerpharm (Germany) to Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland);
- from Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) to Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium);
- from Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) or from Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) to Azopt eye drops, 10 mg/ml , 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland).

Dominant schemes, switching to which requires additional costs are:

- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) or Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) or Azopt eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) compared to Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1 VAT, "Farmak" (Ukraine);
- Arutimol eye drops 0.5%, 5 ml, Chauvin ankerpharm (Germany) + Lanotan eye drops 0.05 mg/ml, 2.5 ml No. 1, VAT "Farmak" (Ukraine) or Azopt eye drops, 10 mg/ml, 5 ml in drop dispenser DROP-TAINER® No. 1, Alcon-Couvreur (Belgium) + Taflotan eye drops 15 µg/ml, 2.5 ml No. 1, Santen (Finland) compared to Travatan eye drops, 40 µg/ml, 2.5 ml in drop dispenser No. 1, Alcon-Couvreur (Belgium).

V. Conclusion

Therefore, using "budget impact" analysis makes possible to evaluate influence of changes in POAG treatment regimens on the cost of the disease therapy. Summarized information may be needed by professionals of health budget planning, insurance experts, heads of health institutions, and employers, which are required to make payments in temporary disability fund.

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