

ROLE AND IMPORTANCE OF THE INTERNATIONAL COMPARATIVE PHARMACOECONOMICS STUDIES IN THE HEALTH CARE

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Being international in science

- Unavoidable fact;
- Necessary cooperation;
- Mutual exchange of ideas, knowledge, achievements;
- Enrichment of scientists.

Comparative international studies

- Benchmarking;
- Share similarities and differences;
- Impose unified scientific standards.

Comparative pharmacoeconomic studies

- Compare the cost of therapies;
- Compare the health care, economic and social outcomes;
- Compare cost-effectiveness of health care interventions;
- Solve transferability issues.

Pharmacoeconomic and comparative pharmacoeconomic studies between Bulgaria and Serbia – some examples

Main question

- What are the benefits of performing international comparative studies?

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Pharmacy network and access to medicines in selected eastern European countries: comparative analysis

Aim To analyze the pharmacy network (structure and resources) in Bulgaria, Croatia, Serbia, and Slovenia and its relation to public expenditures for medicines.

Methods We performed a cross-sectional study using the officially published data for the period 2003-2008 in four selected countries. Data sources were relevant national institutions.

Results In 2008, Serbia had 27.5, Bulgaria 66.8, Croatia 59.5, and Slovenia 71.2 pharmacists per 100 000 inhabitants. There was a significant difference in the number of pharmacists per 100 000 inhabitants between all countries except between Bulgaria and Slovenia. The number of inhabitants per one pharmacy was significantly different between all observed countries, except between Bulgaria and Slovenia. The expenditures for medicines per capita in 2008 were between €30.34 in Bulgaria to €137.03 in Slovenia, with a significant difference between all countries except between Bulgaria and Serbia. The number of pharmacists per 100 000 inhabitants and expenditures for medicines per capita were positively correlated in all observed countries, except in Bulgaria.

Conclusion There were significant difference in the structure and availability of the pharmacy service in all selected countries. Expenditures for medicines were positively correlated with the number of pharmacists in all countries, except in Bulgaria. Our findings could be valuable to national regulatory bodies for the creation of national drug policies.

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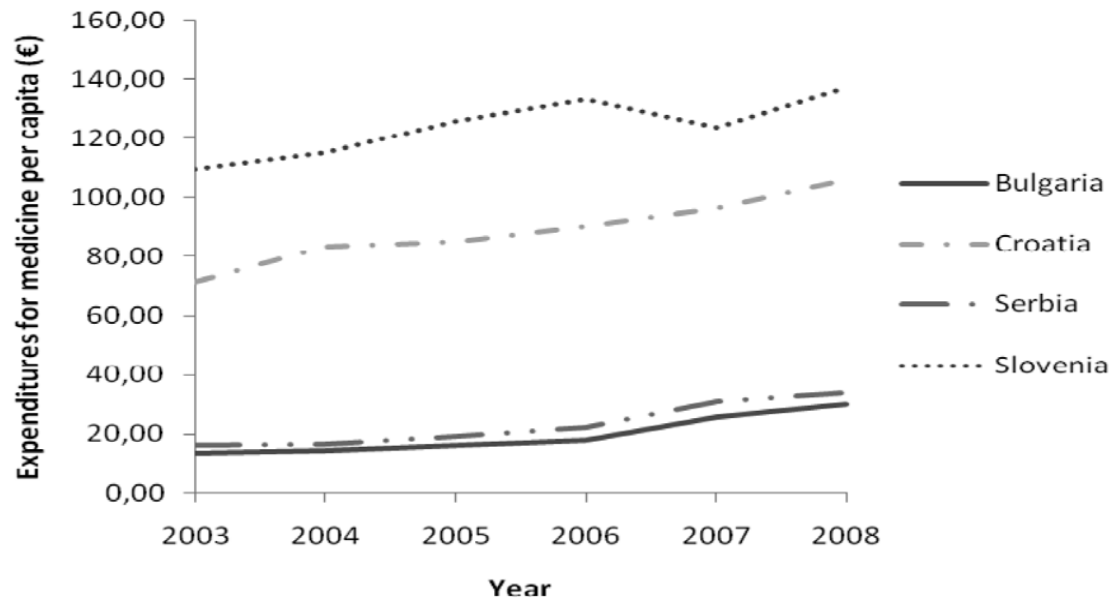
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Aim and Conclusions

- **Aim** - To analyze the pharmacy network (structure and resources) in Bulgaria, Croatia, Serbia, and Slovenia and its relation to public expenditures for medicines.



- **Conclusion** - There were significant difference in the structure and availability of the pharmacy service in all selected countries. Expenditures for medicines were positively correlated with the number of pharmacists in all countries, except in Bulgaria. Our findings could be valuable to national regulatory bodies for the creation of national drug policies.

THE COST-EFFECTIVENESS OF HYPERTENSION PHARMACOTHERAPY IN SERBIA: A MARKOV MODEL

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ABSTRACT

To date there is no Markov model to evaluate the cost-effectiveness of antihypertensive pharmacotherapies at national level in developing countries. The aim of our study was to evaluate different antihypertensives and determine their cost-effectiveness as monotherapy treatment in primary care in Serbia.

We developed a Markov model to estimate quality-adjusted life years (QALY), lifetime costs and incremental cost-effectiveness of different antihypertensive medicines used in the clinical practice in Serbia (diuretic, beta blocker, Ca channel blocker and ACE inhibitors) to strategy "no intervention". Cohort of 55-year-old patients with hypertension (systolic and diastolic blood pressure ≥ 140 and 90 mmHg), without cardiovascular complications was run through the model. Acute myocardial infarction, angina pectoris, heart failure, stroke, and total mortality were observed as outcomes. The time horizon was over a lifetime, and the perspective was that of a third-party payer. Annual discount rate of 5% was applied to all future costs and effects.

The results showed small differences in QALY in strategies ACE inhibitor, beta blockers, and diuretic. The incremental cost-effectiveness ratio (ICER) for diuretic, compared to no intervention, was €74.27/QALY. The ICER for beta blocker compared to diuretic was €75.58/QALY. ACE inhibitor was extended dominated by diuretic and beta blocker, while Ca channel blocker had higher costs and less effectiveness compared to all previous strategies. The results of the probabilistic sensitivity analysis showed that application of antihypertensive therapy is cost-effective even at small values of willingness to pay.

It could be concluded that for individuals aged 55 the diuretics are the most cost-effective strategy to start monotherapy of hypertension.

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Keywords: hypertension, cost-effectiveness, pharmacotherapy, Markov model, Serbia**Conflict of interest:** Authors declare no conflict of interest

Introduction

Hypertension (HT) is an important challenge to public health. According to statistics, in 2000 over one quarter of the adult population worldwide suffered from HT. It has been predicted that by 2025 this proportion will reach nearly 30% (29). HT is one of the major risk factors for ischemic heart disease, cerebrovascular diseases, diseases of peripheral arteries and other cardiovascular disease (CVD) complications. The effectiveness of antihypertensive therapies is well established and documented in terms of risk reduction for stroke and other CVD events (17, 18, 42). The European Society of Hypertension and the European Society of Cardiology stated in their guidelines that all antihypertensive therapies can be considered as first-line choice drugs (34). Accordingly, the costs of antihypertensive pharmacotherapy and CVD complications have become extremely important (6). CVDs can pose a great burden on any healthcare system. In 2003 the cost of CVD in the European Union was almost 105 billion euros, or 12% of the total healthcare expenditure (31).

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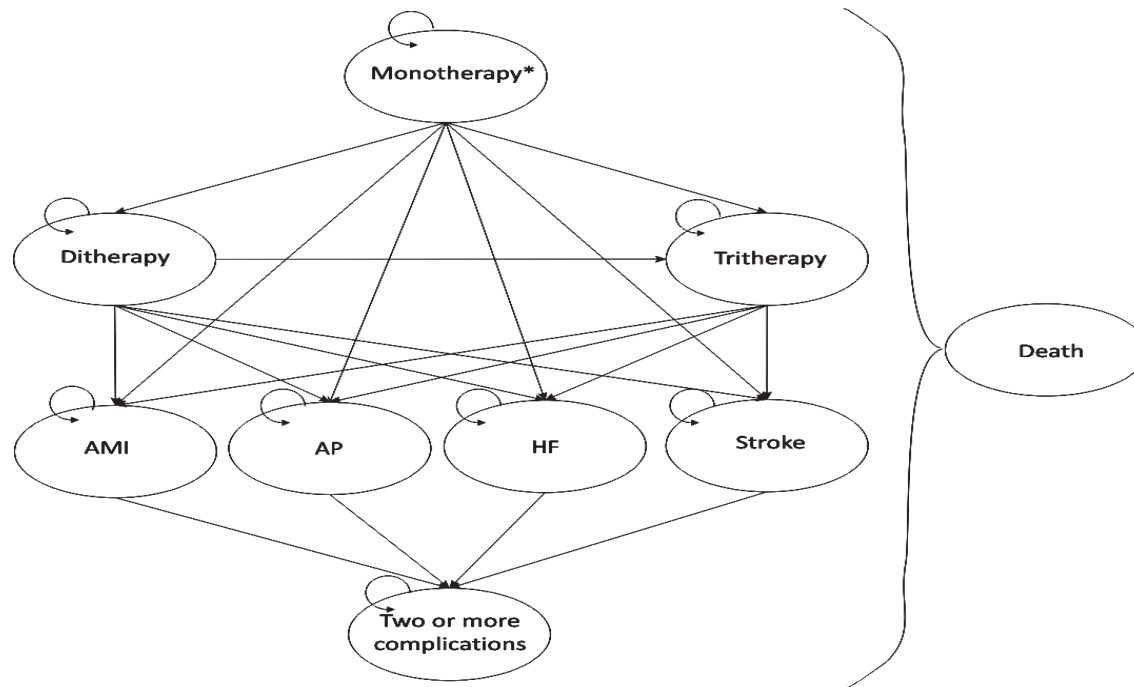
Economic evaluation in health care is defined as the comparative analysis of alternative options in terms of their costs and consequences (14). Different cost models have been created for evaluation of the cost and cost-effectiveness of hypertension pharmacotherapy. Lloyd et al. (32) created a burden-of-disease model and estimated that in the UK, in general, 16 million adults have blood pressure in the range of 140/90–160/95 mm Hg and above and that 58,000 major cardiovascular events per year occur in these patients. Hansson et al. (22) estimated the burden of failing to achieve targets for blood pressure control in France, Germany, Italy, Sweden and the UK by constructing a cost-of-illness model and calculated that 1.26 billion euros could be saved if HT management achieved blood pressure targets. Flack et al. (15) developed a model to estimate the number of cases and costs of myocardial infarction, stroke and congestive heart failure and, in doing so, discovered that inadequate control resulted in 39,702 cardiovascular events and 8,374 deaths thus leading to \$964 million of direct medical expenditure.

The Markov decision model, a powerful analytical tool in economic evaluations, allows modelling of patients' preferences and costs over patients' lifetime. Markov models have been constructed for the evaluation of the cost-effectiveness of

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Aim and Conclusions

- **Aim:** To evaluate different antihypertensives and determine their cost-effectiveness as monotherapy treatment in primary care in Serbia.



- **Conclusion:** It could be concluded that for individuals aged 55 the diuretics are the most cost-effective strategy to start monotherapy of hypertension.
- **Comment** – Similar model will be used to analyse the Bulgarian prescribing therapy

IMPACT OF DISCOUNTING IN PHARMACOECONOMIC MODELING.
A CASE STUDYDragana Lakić¹, Guenka Petrova², Nataša Bogavac-Stanojević², Zorana Jelić-Ivanović²¹ University of Belgrade – Faculty of Pharmacy, Department of Social Pharmacy and Pharmacy Legislation, Belgrade, Serbia² Medical University – Sofia, Faculty of Pharmacy, Sofia, Bulgaria³ University of Belgrade – Faculty of Pharmacy, Institute of Medical Biochemistry, Belgrade, Serbia

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ABSTRACT

Discounting adjusts future costs and benefits in terms of their present value. The purpose of this study was to present the effect of discounting on Markov model prepared for the evaluation of the different antihypertensive treatments in Serbia.

The Markov model consisting of eight states with the cycle length of six months was constructed. Comparator strategies were diuretic, beta blocker, calcium channel blocker and ACE inhibitors. All therapeutic strategies were compared with strategy “no intervention”. Complications of hypertension (acute myocardial infarction, angina pectoris or stroke alone or in combinations) and total mortality were observed as outcomes. Time horizon of the study was lifetime of the patient or 100 years old, due to assumption that 99% of the cohort would die at that age. Analyses were performed from the third-party payer perspective. Annual discount rate of 5% was applied at all future costs and effects.

Undiscounted results showed that patients who started treatment with a beta blocker had the highest life expectancy (49.00 QALY) and being the most cost-effective strategy (ICER = €46.63/QALY compared to no intervention). In the case of discounting the highest gain in the QALY had patients who were on beta blocker, 23.7 QALY. After the discounting cost-effective strategies were ACE inhibitor (ICER = €253.08/QALY compared to no intervention) and diuretic (ICER = €262.54/QALY compared to no intervention).

The results of the study showed that the discounting could change the choice of cost-effective therapeutic strategy.

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Keywords: Markov model, discounting, antihypertensive medication

Introduction

Cost-effectiveness has become “the fourth hurdle” presented in front of the medicines in order to bring them to the market (10). Modeling is considered as vital part of the pharmacoeconomic studies. The model represents a simplified picture of reality, and is used when it is not possible to conduct economic evaluations parallel with the clinical study or is not possible to obtain long term data for the expected clinical results. The clinical trials for obtaining marketing authorization are focused on medicines safety and efficacy, and are not created with the intention of collecting data on costs, as well as on effectiveness. Most clinical studies has a limited number of comparative strategies (usually two, rarely more) and short follow-up (3). When costs or benefits of treatment occur over a long period of time, it is necessary to take into account the time preference for money and benefits. Discounting adjusts future costs and expresses all costs and monetary benefits in terms of their present value (8).

The purpose of this study was to present the effect of discounting on pharmacoeconomic model prepared for the cost-effectiveness evaluation of the different antihypertensive treatments in the prevention of cardiovascular disease (CVD) complications in primary care in Serbia. The study question

was: what is the impact of discounting on the choice of cost-effective therapeutic strategy?

Materials and Methods

Model and strategies

The therapy of the hypothetical cohort of 55 years old patients with hypertension (systolic and diastolic blood pressure ≥ 140 and 90 mmHg, respectively), without other CVD complications or risk factors was modeled. Comparator strategies were antihypertensive groups of medicines present in clinical practice (diuretic, beta blocker, calcium channel antagonist and ACE inhibitors). All therapeutic strategies were compared with strategy “no intervention”, to cover the patients who for any reason are not compliant with their therapy. Combined therapy was modeled according to clinical practice (11), e.g. monotherapy with ACE inhibitor meant inclusion of diuretic (di-therapy) and beta blocker as tri-therapy.

A Markov model was constructed using the TreeAge Healthcare module version 1.5.2 (TreeAge Software, INC., Williamstown, Massachusetts, USA). The model consists of 8 defined health states (Fig. 1) identical in structure to all strategies except for no intervention (due to no adherence to therapy, there are no mono-, di- or tri-therapy states). At the start patients are assumed not to have any cardiovascular comorbidity. The arrows show cohort movement through the model. At any point in time a patient can be in only one of

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Aim and Conclusions

- **Aim** - To present the effect of discounting on Markov model prepared for the evaluation of the different antihypertensive treatments in Serbia.
- **Conclusion** - The results of the study showed that the discounting could change the choice of cost-effective therapeutic strategy.

Original Research

Cost of outpatient hypertension pharmacotherapy: comparative study between Bulgaria and Serbia

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ABSTRACT

Objective: To compare the prescribing practice and pharmacotherapy outpatient cost of hypertension and its common complications between two neighboring countries, Bulgaria and Serbia. The study questions focus on consistency of the prescribing practice with the treatment guidelines; comparability of the treatment patterns among both countries, and burden of hypertension cost to the population and third party payer in the countries under consideration.

Methods: Retrospective study, one year time horizon is for outpatient therapy.

Results: Patients with arterial hypertension in Bulgaria are most often on monotherapy (61% vs 6% in Serbia), as well as those with complications (66% vs 0% Serbia). In both countries the first choice of therapy are the ACE inhibitors (37.01% in Serbia and 41% in Bulgaria) and then follows the calcium antagonists, beta-blockers, and diuretics. The weighed monthly cost of hypertension and complicated hypertension is almost doubled in Serbia (12.56 vs 8.23 EUR for hypertension, and 13.39 vs 8.23 EUR) and prevailing part is reimbursed (88% vs 44% in Bulgaria).

Conclusion: Our study confirms that hypertension and its complications therapy consumes a huge amount of financial resources. In both countries under consideration the therapy is corresponding with the European treatment guidelines. The international cost comparisons are possible but they depend on many external factors as the regulatory measures, prescribing habits and reimbursement policy and should be analysed within this framework.

Keywords: Hypertension. Drug Costs. Health Expenditures. Serbia. Bulgaria.

COSTE DE LA FARMACOTERAPIA ANTIHIPERTENSIVA AMBULATORIA: ESTUDIO COMPARATIVO ENTRE BULGARIA Y SERBIA

RESUMEN

Objetivo: Comparar las prácticas de prescripción y el coste del tratamiento ambulatorio de la hipertensión y sus complicaciones comunes en dos países vecinos, Bulgaria y Serbia. Las preguntas de investigación se centran en la consistencia de las prácticas de prescripción con las guías de tratamiento; la comparabilidad de los patrones de prescripción entre los dos países, y el peso del coste de la hipertensión para la población y las aseguradoras en los países en estudio.

Métodos: Estudio retrospectivo con un horizonte temporal de un año para el tratamiento ambulatorio.

Resultados: Los pacientes con hipertensión arterial en Bulgaria están más frecuentemente en monoterapia (61% vs 6% en Serbia). En ambos países la primera elección de tratamiento son los IECA (37,01% en Serbia y 41% en Bulgaria) seguidos de los calcio-antagonistas, betabloqueantes y diuréticos. El coste mensual ponderado de la hipertensión complicada es casi el doble en Serbia (12,56 vs 8,23 EUR para hipertensión y 13,39 vs 8,23 EUR) y la parte principal es reembolsada (88% vs 44% en Bulgaria).

Conclusión: Nuestro estudio confirma que la hipertensión y sus complicaciones consumen una enorme cantidad de recursos financieros. En ambos países estudiados el tratamiento se corresponde con las guías europeas de tratamiento. Las comparaciones internacionales de costes son factibles pero dependen de muchos factores externos como las medidas regulatorias, los hábitos de prescripción y las políticas de reembolso, y deberían analizarse en estos marcos.

Palabras clave: Hipertensión. Coste de medicamentos. Gastos en salud. Serbia. Bulgaria.

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Aim and conclusion

- **Aim** - To compare the prescribing practice and pharmacotherapy outpatient cost of hypertension and its common complications between two neighboring countries, Bulgaria and Serbia.
- **Results:** Patients with arterial hypertension in Bulgaria are most often on monotherapy (61% vs 6% in Serbia), as well as those with complications (66% vs 0% Serbia). In both countries the first choice of therapy are the ACE inhibitors (37.01% in Serbia and 41% in Bulgaria) and then follows the calcium antagonists, beta-blockers, and diuretics. The weighed monthly cost of hypertension and complicated hypertension is almost doubled in Serbia (12.56 vs 8.23 EUR for hypertension, and 13.39 vs 8.23 EUR) and prevailing part is reimbursed (88% vs 44% in Bulgaria).
- **Conclusion:** Our study confirms that hypertension and its complications therapy consumes a huge amount of financial resources. In both countries under consideration the therapy is corresponding with the European treatment guidelines. The international cost comparisons are possible but they depend on many external factors as the regulatory measures, prescribing habits and reimbursement policy and should be analyzed within this framework.



How much do we pay for Caesarean section - a pilot study in Serbia

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Background: Different types of labour need different resources. Subsequently, different costs should be expected. **Aim:** The aim of the study was to determine costs of planned Caesarean section (C-section) in relation to costs of spontaneous (SVD) and induced vaginal (IVD) delivery. **Methods:** Retrospective study was conducted for the period January 1st - December 31st, 2010. Database of Health Insurance Fund of Republic of Serbia was used as a data source. Direct medical costs of labor were estimated for mother/newborn pair. **Results:** The sample was consisted of 99 women where 46.5% had SVD, 28.3% IVD and 25.2% C-section. The average costs of labor, regardless of method, were 417.02±284.14 EUR. Costs of C-section were higher compare to SVD (640.18±240.04 vs. 243.27±131.70 EUR, $p<0.05$) and IVD (640.18±240.04 vs. 497.10±327.91 EUR, $p<0.05$). **Conclusion:** Considering high costs of C-section, it is necessary to review such clinical practice for the purpose of optimizing the use of resources.

Key words: costs and cost analysis, obstetric delivery, cesarean section

INTRODUCTION

Estimation of costs related to health resources (e.g. drugs, medical devices) and services in the process of labour is the cost of illness (COI) study. COI studies estimate different types of costs which one disease or health condition cares for the society. Accordingly, results of these studies could help in determination of research and funding priorities by highlighting points where inefficiencies may exist and savings may be done¹.

Labour (partus) evolves three stages, where the second one is delivery of a child. Natural route of delivery is vaginal route helped by birth contractions². However, planned Caesarean section (C-section) without labour became frequent recent years in Serbia where reached 19.3 and

21.6 % in 2008 and 2009, according to Institute of public health of Serbia. Concurrently, the World Health Organization (WHO) recommended the rate of C-section 10-15% for the national level³. There was one previous clinical study which reported higher costs of C-section compare to vaginal delivery in Serbia⁴. However, results were based on data set from the only one clinical centre.

Different types of labour and methods of delivery have advantages and disadvantages, whether in terms of maternal or child outcomes⁵. Accordingly, different resources are needed and different costs should be expected. In accordance with the high rate of C-section in Serbia, this study was done with the aim to determine the costs of planned C-section without labor in relation to costs of spontaneous and induced labour with vaginal delivery for the national level.

PATIENTS AND METHODS

We conducted retrospective, population-base study for the period January 1st - December 31st, 2010. Database of Health Insurance Fund of Republic of Serbia (HIFRS) was used as a data source. All costs were estimated from the perspective of HIFRS.

Database contained data on amount and costs of all drugs, medical devices (MD) and health care services used by women and newborns during labour and postpartum/postnatal hospital stay. Database, also, contained data about age of pregnant women, type of labour and method of delivery, duration of postpartum and postnatal hospital stay (in days) at general, semi-intensive or intensive care units. Besides, different types of complications at delivery were, also, collected. Ruptures of perineum, vagina, or cervix, forceps, and C-section in the vaginal labour were considered as complications of spontaneous and induced vaginal labour. Complications due to anaesthesia were considered as complications of C-section delivery without

Aim and conclusion

- **Aim** - The aim of the study was to determine costs of planned Caesarean section (C-section) in relation to costs of spontaneous (SVD) and induced vaginal (IVD) delivery.
- **Conclusion** - Considering high costs of C-section, it is necessary to review such clinical practice for the purpose of optimizing the use of resources.

Original paper

Economic evaluation of different screening alternatives for patients with clinically suspected acute deep vein thrombosis

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Abstract

Introduction: We examined the cost-effectiveness of the three different D-dimer measurements in the screening of DVT in models with and without calculation of pre-test probability (PTP) score. Moreover, we calculated the minimal cost in DVT detection.

Material and methods: In the group of 192 patients with clinically suspected acute DVT, we examined the three different D-dimer measurements (Innovance D-dimer, Hemosil D-dimer HS and Vidas D-dimer Exclusion II) in combination with and without PTP assessment.

Results: The diagnostic alternative employing Vidas D-dimer Exclusion II assay without and with PTP calculation gave lower incremental cost-effectiveness ratio (ICER) than the alternative employing Hemosil D-dimer HS assay (0.187 Euros vs. 0.998 Euros per one additional DVT positive patient selected for CUS in model without PTP assessment and 0.450 vs. 0.753 Euros per one DVT positive patient selected for CUS in model with PTP assessment). According to sensitivity analysis, the Hemosil D-dimer HS assay was the most cost effective alternative when one patient was admitted to the vascular ambulance per day. Vidas D-dimer Exclusion II assay was the most cost effective alternative when more than one patient were admitted to the vascular ambulance per day. Cost minimisation analysis indicated that selection of patients according to PTP score followed by D-dimer analysis decreases the cost of DVT diagnosis.

Conclusions: ICER analysis enables laboratories to choose optimal laboratory tests according to number of patients admitted to laboratory. Results support the feasibility of using PTP scoring and D-dimer measurement before CUS examination in DVT screening.

Key words: cost-effectiveness analysis; D dimer; deep vein thrombosis; pre-test probability score

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Introduction

Deep vein thrombosis (DVT) occurs in the western world with a frequency of approximately 1 per 1000 individuals per year (1). The clinical conditions that predispose DVT are: increasing age, cancer, prolonged immobilization, stroke, previous DVT, congestive heart failure, hormonal treatment, pregnancy or puerperium, acute inflammatory bowel disease, atherosclerotic disease, long air travel (2,3). However, DVT also occurs without an obvious precipitating factor. As DVT is a condition with significant morbidity, rapid diagnosis and effective anticoagulant treatment is required (4,5).

The test of choice for clinically suspected DVT is compression ultrasonography (CUS) (6). The sensitivity for proximal DVT has been reported as 97% but for calf DVT it could be considerably less (73%) (7). Repeated or serial venous ultrasound examination is indicated for initially negative examination result in symptomatic patients, DVT 'unlikely' patients (by Wells score), and patient with negative D-dimer test (8). CUS procedure is time consuming and expensive. Therefore, considerable efforts are being made to design diagnostic algorithms to improve the diagnosis of DVT-suspected outpatients.

Aim and conclusion

- **Introduction:** We examined the cost-effectiveness of the three different D-dimer measurements in the screening of DVT in models with and without calculation of pre-test probability (PTP) score.
- **Results:** The diagnostic alternative employing Vidas D-dimer Exclusion II assay without and with PTP calculation gave lower incremental cost-effectiveness ratio (ICER) than the alternative employing Hemosil D-dimer HS assay (0.187 Euros vs. 0.998 Euros per one additional DVT positive patient selected for CUS in model without PTP assessment and 0.450 vs. 0.753 Euros per one DVT positive patient selected for CUS in model with PTP assessment). According to sensitivity analysis, the Hemosil D-dimer HS assay was the most cost-effective alternative when one patient was admitted to the vascular ambulance per day. Vidas D-dimer Exclusion II assay was the most cost-effective alternative when more than one patient were admitted to the vascular ambulance per day.
- **Conclusions:** ICER analysis enables laboratories to choose optimal laboratory tests according to number of patients admitted to laboratory. Results support the feasibility of using PTP scoring and D-dimer measurement before CUS examination in DVT screening.

THE HEALTH RELATED QUALITY OF LIFE FOR KIDNEY TRANSPLANT PATIENTS IN BULGARIA – A PILOT STUDY

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ABSTRACT

The aim of the present study was to analyze the pharmacotherapy cost and quality of life of patients after kidney transplantation compared to those with chronic kidney disease in Bulgaria. This retrospective pharmacotherapy cost study and prospective health related quality of life (QoL) study was performed during 2010 – 2011 at the biggest Sofia hospital serving all transplant patients. The cost of pharmacotherapy was analyzed after reviewing patients' records. The health related quality of life was evaluated with the multi-attributable questionnaire SF-36, which measures 9 health domains.

Forty-two percent of the patients with chronic kidney disease, and 26% of those with kidney transplant were female. The average age of the transplanted patients was 39.7 for male patients and 42.2 for female ones, while in the group suffering from chronic kidney disease the average male age was 48.3 and that of female patients, 51.2. No statistically significant difference was observed among the mean monthly cost of therapy per patient during the two-year period. The QoL was with lower values in the role limitations domain for patients with chronic kidney diseases and this difference was statistically significant. We found a correlation among the mean cost of pharmacotherapy and mean QoL in both groups of patients. In the group of patients with kidney transplantation the place of living and general health state were positively correlated. The cost of pharmacotherapy and the health state in comparison with the previous year were also positively correlated.

This is the first Bulgarian study of the quality of life of kidney transplant patients. It shows that the SF-36 could be successfully used in this group of patients as well as for comparison with the QoL of patients with chronic kidney disease.

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Keywords: kidney transplantation, quality of life, SF-36, pharmacoeconomics

Introduction

Health care has two ultimate goals, which are to prolong the life and to increase the quality of life. Measuring the health related quality of life gives important information about the health care progress. The chronic kidney disease affects more and more people in recent years and the need for transplantation increases (6). Worldwide there are 1.1 million patients registered in end-stage chronic kidney disease and their number increases with 7% per year. The prevalence of the disease is 135 per million inhabitants in Europe and 336 in the USA and increases permanently mainly as a result of diabetes progress. The survival after kidney transplantation is from 88% to 95% in the case when a dead or living donor is used, respectively (1). There are studies showing that the quality of life of patients with chronic kidney disease is severely hampered, but what happens after the kidney transplantation is relatively rarely studied (9).

The goal of our study was to analyze the cost of pharmacotherapy and quality of life of patients after kidney transplantation compared to those of patients with chronic kidney disease in Bulgaria.

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Materials and Methods

A retrospective pharmacotherapy cost study and prospective health related quality of life study was performed during 2010 – 2011 at the biggest Sofia hospital serving all transplant patients. The cost of pharmacotherapy was analyzed after reviewing records of all patients with chronic kidney disease and kidney transplantation. Mean cost per month was calculated for both diagnoses.

The health related quality of life (QoL) was evaluated with the multidimensional questionnaire SF-36. The SF-36 is a self administered questionnaire containing 36 items. It measures health on eight multi-item dimensions covering physical functioning, role limitations, bodily pain, social functioning, general mental health, role limitations due to emotional problems, vitality, energy or fatigue, general health perceptions. There is also health state self evaluation in comparison with the previous year. For each dimension, item scores are coded, summed, and transformed on to a scale from 0 (worst health) to 100 (best health) (7). The SF-36 was previously used and validated for Bulgaria for patients with chronic kidney disease (9). Sixty-two transplant and 19 patients with chronic kidney diseases were interviewed.

Descriptive statistics, one way ANOVA analysis, Spearman correlation, and Kruskal-Wallis analysis were performed to evaluate the statistical significance of the differences in the QoL

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Aim and conclusion

- **Aim** - of the present study was to analyze the pharmacotherapy cost and quality of life of patients after kidney transplantation compared to those with chronic kidney disease in Bulgaria.
- **Results** - The average age of the transplanted patients was 39.7 for male patients and 42.2 for female ones, while in the group suffering from chronic kidney disease the average male age was 48.3 and that of female patients, 51.2. No statistically significant difference was observed among the mean monthly cost of therapy per patient during the two-year period. The QoL was with lower values in the role limitations domain for patients with chronic kidney diseases and this difference was statistically significant. We found a correlation among the mean cost of pharmacotherapy and mean QoL in both groups of patients. In the group of patients with kidney transplantation the place of living and general health state were positively correlated. The cost of pharmacotherapy and the health state in comparison with the previous year were also positively correlated.
- **Conclusion** - This is the first Bulgarian study of the quality of life of kidney transplant patients. It shows that the SF-36 could be successfully used in this group of patients as well as for comparison with the QoL of patients with chronic kidney disease.

Conclusion

- The international comparative pharmacoeconomic studies creates a mutual and deep understanding of the similarities and differences among the:
 - pharmaceutical systems functioning;
 - financing the access to medicines;
 - evaluating the cost – effectiveness of therapeutic options;
 - evaluating the cost – effectiveness of diagnostic strategies;
 - Comparing cost of therapeutic alternatives;
 - evaluating the quality of life of patients.
- **Being international in science is not only an inevitable fact but it is a highly appreciated.**

Thank you for the attention