JHPOR | Journal of Health Policy & Outcomes Research

Analysis of direct costs of drug-induced skin reactions treatment considering DRG classification in the perspective of medical service provider and public payer

N.Wiśniewska, Department of Dermatology, Military Institute of Medicine, Warsaw, Poland
E.B.Paluchowska, Department of Dermatology, Military Institute of Medicine, Warsaw, Poland
W.Owczarek, Department of Dermatology, Military Institute of Medicine, Warsaw, Poland
M.Szkultecka-Dębek, Roche Polska Sp. z o.o., ul. Domaniewska 39B, 02-672, Warsaw, Poland
K.Jahnz-Różyk, Department of Immunology and Allergology, Military Institute of Medicine, Warsaw, Poland

Keywords:
Adverse drug reactions, direct costs, DRG - diagnosis related groups, National Health Fund, pharmacoeconomics

DOI: 10.7365/JHPOR.2013.4.8
JHPOR, 2014, 2, 70-77

ABSTRACT

Background: **The aim of this study is an assessment of direct costs of patients' hospitalization caused by drug-induced skin reactions in Dermatology Department of Military Institute of Medicine during the period 2002-2012 from the public payer's perspective and service provider, based on the DRG classification.**

Data and methods: **The study was carried out in a retrospective way on a group of 164 adult patients hospitalized in Department of Dermatology between 2002 and 2012. The analysis was based on data from patients' medical records. Due to the changes in health care system settlement during the long period taken into account for resources used identification, the one-year time horizon was settled to standardize cost calculations. The costs were evaluated in the perspective of public payer and service provider based on the DRG classification.**

Results: **It was evaluated, that patient hospitalization due to drug-induced skin reactions within specific DRGs (J38 and J39), in the perspective of the public payer costs on average 971 euro per patient (J38) and 481 euros (J39) depending on the DRG group. When analyzing the complex diagnostics and pharmacologic therapy of the same group of patients in the perspective of the hospital costs the results is 636 euro in the J38 and 558 euro in J39 group per patient.**

Conclusions: **Within the DRG, in case of J38 group the National Health Fund bear higher treatment costs than health care service provider. Higher costs are usually connected with higher amount of diagnostic examinations in case of severe dermatologic diseases, qualified to the J39 group**

INTRODUCTION

Adverse effects of drugs are still a major challenge for physicians, pharmacists and the patients. Particular attention should be given to OTC drugs (over the counter), which can also cause adverse reactions. In last several years the sale of drugs in Poland is increasing. Our country is the sixth biggest drug market in Europe as stated by Office for Registration of Medicinal Products, Medical Devices and Biocides in 2010 [1].

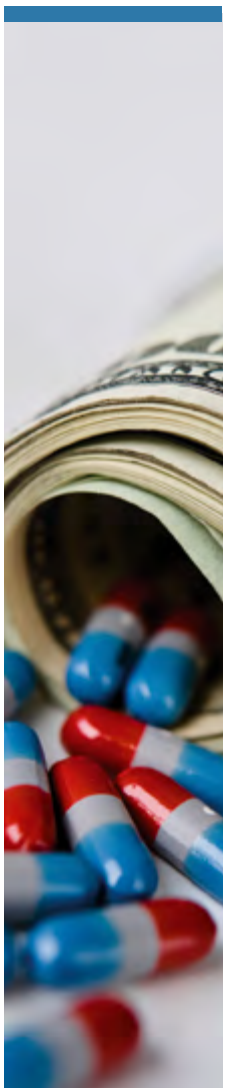
The drugs can cause severe adverse reactions which may become life-threatening or lead to death, hospitalization, permanent disability, malformations or other reactions, which can be assessed as severe by the physician [2].

They occur in different age ranges, however their prevalence is higher in adults than in chil-

dren. They affect 7% of population – 30% of them are drug-induced skin reactions [3].

The clinical picture of drug-induced skin reactions is diverse, often imitates other dermatoses. For the last few years in Poland, as worldwide, the economic analyses evaluating costs of the adverse treatment reactions are performed. The results of these studies are often of significance, supporting decisions, which implement new and/or modify actual therapeutic standards.

Following the Polish Law, an assessment of the economic component is obligatory in drug reimbursement approving procedure, in order to optimize the allocation of funds by the public payer. Economic analyses as part of the Health Technology Assessment (HTA) dossier are evaluated by experts of the Agency for Health Technology Assessment and the process is completed by a recommendation on a new technology issued by the Chairman of the Agency for the Minister of Health. The adverse reactions are part of every HTA analysis, not only for safety conclusions but also as one of the costs component included in the pharmacoeconomic evaluations.



BACKGROUND

The aim of this study is an assessment of direct costs of patients hospitalization caused by drug-induced skin reactions in Department of Dermatology Military Institute of Medicine between 2002 and 2012 from the perspective of public payer and service provider, based on the homogenous DRG (Diagnosis Related Group classification).

DATA AND THE METHODS

It was a retrospective study. The analysis was performed on data collected from patients' medical records and medical order cards. All those documents provided information on used resources, such as diagnostic tests, specialist consultations, administered medicinal products (used for treatment) and hospitalisation period. Based on the identified resources, used for the adverse reactions treatment, the costs of the therapy were estimated. The costs of laboratory diagnostic tests, specialist consultations and hospitalisation were evaluated based on internal hospital pricelist determined by Medical Services Sales Department of Military Institute of Medicine in the 2012. Cost of pharmacotherapy was evaluated based on drug's wholesale prices in 2012.

From the public payer's perspective, the costs of specialist consultation visits (dermatologist), laboratory diagnostic tests and hospitalisations were taken into account on the basis of prices for medical services, determined by the National Health Fund via contracts with healthcare units, following the Act on medical services, financed from public funds in 2012. In case of a contract with the National Health Fund, the costs of laboratory tests, other diagnostic tests and are included in the costs of the, so-called, specialist visit. The value of service costs, incurred by the National Health Fund, was based on the International Statistical Classification of Diseases and Related Health Problems – ICD 10 and the Diagnosis Related Groups (DRG).

The analyzed group of patients was classified according to different criteria, such as: age, diagnosis, drugs which caused drug-induced dermatoses and ICD 10 criteria.

In order to obtain accurate analysis an analytic tool in Microsoft Excel was created. Usage of this tool allowed to calculate costs of used drugs, performed laboratory tests, overall and average costs of hospitalization and on the basis of prescriptions drugs the costs generated by the need to continue the treatment in outpatient setting. The analysis considered only the cases of drug-induced skin adverse reactions, which presented explicit form and drug dosage.

RESULTS

Between the years 2002 – 2012 there was 10267 patients hospitalized in Department of Dermatology Military Institute of Medicine, including 164 patients (57 male and 107 female patients) with drug-induced skin adverse reactions, which is 1.59% of overall hospitalizations. The average age of patients was 53.7 years.

The most frequently observed adverse reactions were maculopapular rash 52%, erythema multiforme 25% and Stevens-Johnson syndrome 4%. The others are: skin eczema, chronic nettle-rash, toxic epidermal necrolysis (TEN), erythema fixum and phototoxic dermatitis.(Figure 1.)

The drugs which caused drug-induced skin reactions most frequently were antibiotics (45.12%) and NSAIDs (Non-Steroidal Anti-Inflammatory Drugs) (25.6%). Amoxicillin was the most frequently described antibiotic. Among the NSAIDs the most frequently described drug causing skin adverse reactions was ibuprofen. 3 groups of diagnoses were analyzed: severe dermatologic diseases J38, large dermatologic diseases J39 and mild dermatologic diseases J49. The J38 group included 83 patients, J39 – 80 patients and J49 – one patient.

The average age of patients in the J38 group was 59.12 years and among the patients qualified to the J39 group – 50.64 years. Skin drug-induced adverse reactions in patients with severe dermatologic diseases occurred on average after 5.16 days since the drug was administered, and in the group of large dermatologic diseases they occurred after an average of 20.37 days.

The hospitalization period of the patients for the specific groups was respectively: J38 – 4.60 days, J39 – 4.14 days. Following DRG classification, the National Health Fund assigned the following scores, 82 for J38, 33 for J39 and 27 for J39. A score 1equaled to 12,5 euro (year 2012). On this ground the overall cost of direct treatment according to DRG classification from the perspective of public payer was evaluated.

The costs of specialist consultation visits (dermatologist), laboratory diagnostic tests and hospitalization were taken into consideration on the basis of prices for medical services, determined by the National Health Fund via contracts with healthcare units, following the Act on medical services, financed from public funds in 2012. In case of a contract with the National Health Fund, the costs of laboratory tests, other diagnostic tests and pharmacologic therapy are included in the costs of the visits classified as a specialist visit.

rash maculo - papular	85
multiform erythema	41
erythema nodosum	24
Stevens-Johnson syndrome	6
contact dermatitis	2
urticaria	3
toxic epidermal necrolysis	1
fixed erythema	1
drug phototoxic response	1
	164

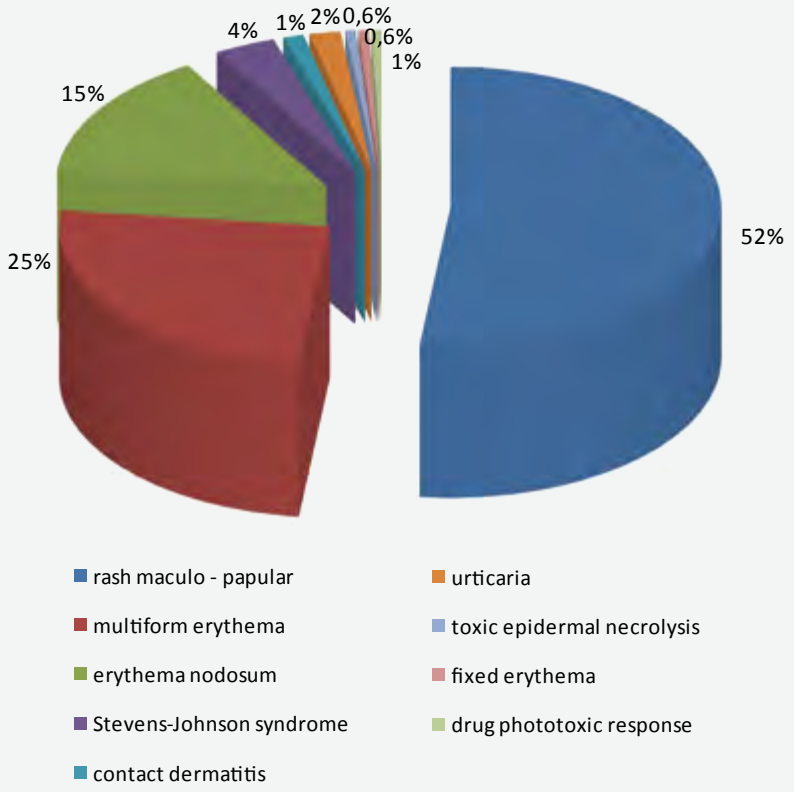


Figure 1. Adverse skin drug reactions

For the group of patients with severe dermatologic diseases (83 patients) the overall direct cost was evaluated and amounted to total sum of 82 444 euro. In the group of large dermatologic diseases there was 80 patients and overall direct cost amounted to 34 097 euro. In the group of mild dermatologic diseases only one case of one patient was analyzed and the cost of direct treatment was 334 euros. The average costs

ICD10	ICD-10 score	M	F	mean age	mean days of hospitalization	drug-induced skin reactions [mean days]	total direct costs - public payer [EUR]	total direct costs - public payer [EUR], mean cost per 1 patient
J38	82	26	57	59,12	4,60	5,16	346268,00	972,00
J39	33	31	49	50,64	4,14	20,37	143208,00	481,00
J49	27	0	1	25,00	2,00	10,00	1404,00	334,00

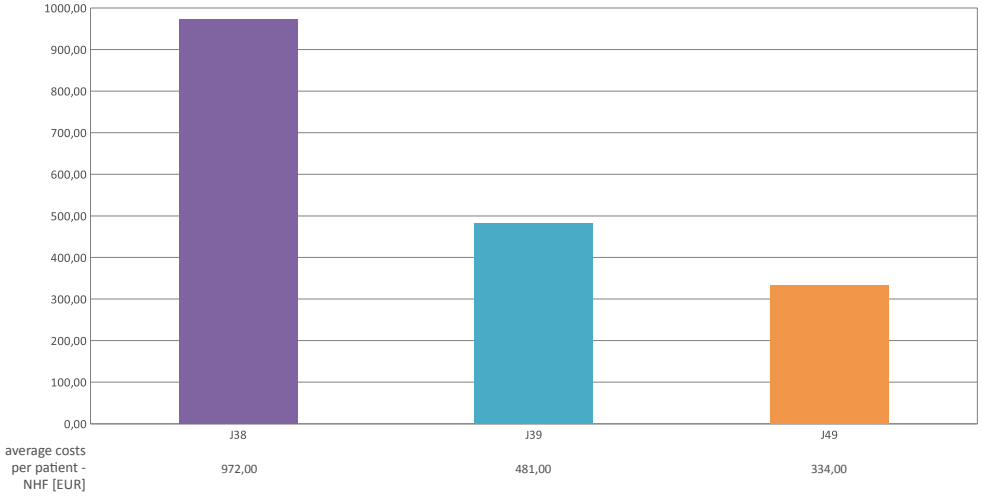


Figure 2. Average costs per patient - NHF

ICD-10 score	total direct costs - service provider	total direct costs- mean cost per 1 patient
J38	231478,50	637,00
J39	231860,52	558,00
J49	1592,00	379,00

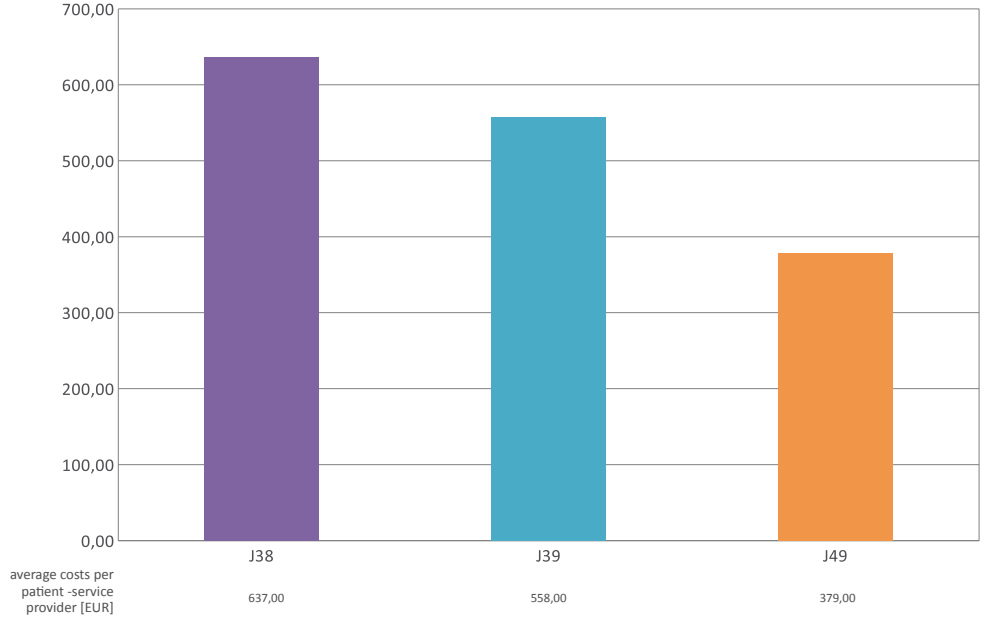


Figure 3. Average costs per patient - service provider

were higher for the patients with J38 diagnosis and amounted to 972 euros, and for the patients with J39 diagnosis– 481 euros. Fig.2. The costs in specific groups depends only on the scores assigned by NHF, without considering the period of hospitalization.

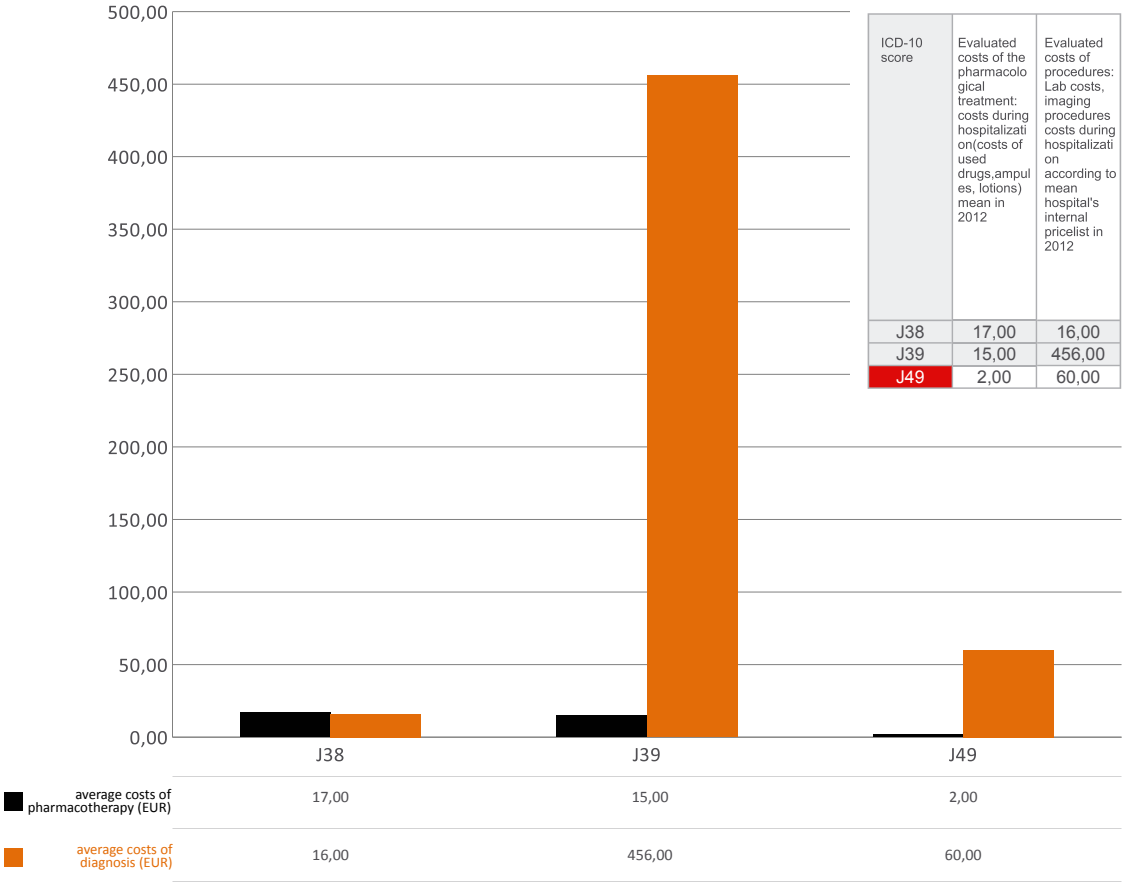
In the perspective of medical service provider in calculation of direct costs the most critical was the hospitalization period and the cost per day of hospitalization, which was 121 euro/day in WIM Department of Dermatology. This amount included physician and medical personnel salary, media, hospital beds and full board costs.

In the group of severe dermatologic diseases (J38) the cost of direct treatment was 55 114 euro. In the group of large dermatologic diseases (J39) it was 55205 euro. In the group of mild dermatologic diseases only one case was analyzed and the cost of direct treatment was 379 euros. The average costs in particular groups are similar and amount to 637 euro in the J38 group and 558 euros for the J39 group. (Figure 3.)

Evaluated costs of the pharmacological treatment in those groups are similar. In the J38 group costs of used drugs was 1778 euro and in the J39 group – 1732 euro. The average costs of the treatment for one patient was 17 euro in J39 and 15 euros in the J39 group. Fig.4. In the analyzed groups the amount of hospitalized patients was almost the same, so assessed costs are the proof, that the costs of pharmacological treatment are comparable in those two different groups.

The costs of diagnostic procedures performed during hospitalization was evaluated on the basis of hospital's internal pricelist and the one-year time horizon (year 2012) was applied in the analysis. In J38 group of patients the cost of medical procedures performed by hospital was 16 euro per one patient.

On the other hand in the J39 group the cost of diagnostic procedures was much higher – 457



ICD-10 score	Evaluated costs of the pharmacological treatment: costs during hospitalization(costs of used drugs,ampules, lotions) mean in 2012	Evaluated costs of procedures: Lab costs, imaging procedures costs during hospitalization according to mean hospital's internal pricelist in 2012
J38	17,00	16,00
J39	15,00	456,00
J49	2,00	60,00

Figure 4. Average costs of pharmacotherapy and diagnosis per patient

euro per patient. Fig.4. The differences in particular groups results from qualifying patients with severe skin adverse reactions to the J39 group. Diseases like erythema multiforme, erythema multiforme major or erythema nodosum are conditions, which require more diagnostic tests and imaging examinations.

DISCUSSION

NOWADAYS, WHEN NEW MEDICINAL PRODUCTS ARE INTRODUCED TO THE MARKET THE SUBJECT OF DRUG-INDUCED CHANGES IS STILL PRESENT. MANY PATIENTS, ESPECIALLY WITH SEVERE DRUG-INDUCED DERMATOSES WILL REQUIRE HOSPITALIZATION.

Facing the challenge of the economic impact in diagnostics and patient treatment, not only for healthcare managers, but also for physicians, who are obligated to perform effective therapy on a basis of available funds, we ran the analysis of direct medical costs for the public payer and health care service provider in the group of 164 patients hospitalized in Department of Dermatology because of drug-induced skin adverse reactions in the years 2002 – 2012.

It was evaluated, that the costs of related to DRG classification, in the perspective of public payer is on average 971 euro per patient in J38 group and 481 euro in J39 group. On the other hand, complex diagnostics and pharmacologic therapy in the same group from the perspective of costs generated by hospital is averagely 636 euro for J38 and 558 euro for J39 per one patient.

As a part of J38 diagnoses, the NHF bears higher costs that medical service provider. In the J39 group the hospital bears higher costs than public payer. Higher costs are mostly connected with bigger amount of required and repeated diagnostic tests in case of severe dermatologic diseases, qualified to the J39 group.

In the published literature a lot of meta-analyses, analyses of direct and indirect cost of drug adverse reactions treatment or cost efficacy analyses are available. Nevertheless, there is still no analyses concerning costs in relation to DRG classification. The Ophthalmic Surgeons Association in Poland released the report concerning costs of surgical cataract removal using phacoemulsification method with implantation of intraocular lens in 2013. The direct and indirect costs listed above were evaluated taking into consideration changes in NHF settlements at the turn of recent years. According to the data published by NHF the average cost of JGP B13 procedure in 2012 – removal of uncomplicated cataract using phacoemulsification method with simultaneous lens implantation - is 722 euro. Obligatory valuation applies (till June 30, 2013) in case of hospitalization scoring 61 points – 858 euro, in case of "one day hospitalization" – 55 points – 732 euros. The costs refunded by NHF are respectively in case of hospitalization – 697 euro and in case of „one day hospitalization" – 629 euros. Since July 01, 2013 new settlement rules concerning JGP B13 procedures were introduced, they standardize points applied to the procedure. On the basis of the new evaluation the costs refunded by NHF were lowered by 69 euro. According to Ophthalmic Surgeons Association in Poland those changes can lead to dangerous savings in medical personal and used medical materials costs, which can influence the patient's quality of life [4].

Nowadays, when new medicinal products are introduced to the market the subject of drug-induced changes is still present. Many patients, especially with severe drug-induced dermatoses will require hospitalization.

The patients should be educated about possible drug adverse reactions. The cooperation of physician and pharmacist is extremely important to report every adverse drug-related reaction to the Department of Monitoring Adverse Drug Reactions, The Office For Registration The Medicinal Products, Medical Devices and Biocidal Products.

Those actions can facilitate quicker detection of dangers coming from drug administration and allow determining their value compared to different drugs from the same therapeutic group[5]. Thanks to this fact the risk that adverse drug-induced reactions occur will be more predictable and the part of those cases will not require hospitalization.

Siok Swan Tan while discussing the DRG and cost accounting systems is comparing the situation in different countries. Some European countries, also Poland, despite having imported

DRG weight from other countries is using cost accounting data in order to adjust the DRGs to local situation. However Poland bases most of their DRG assumptions on UK HRG calculations and calculates locally DRG only for specific procedures. According to Siok Swan Tan the revisions of existing cost-accounting systems should be undertaken in order to improve the effectiveness and fairness of DRG-based hospital payment systems. An accurate cost-accounting system is needed in order the DRG functions well, however, both, DRG and cost accounting should be developed independently of each other to validate the systems' performance individually [6].

CONCLUSIONS

Drug-induced skin reactions therapy is a significant cost both for payer and health care service provider taking into consideration DRG classification. On the basis of analyzed group of patients it may seem, that procedures connected with adverse reactions therapy are correctly evaluated, however limitations of the analysis should be considered, especially the number of analyzed reactions and amount of patients. The attention should also be paid to possible renewed drug-induced dermatoses classification within DRG having regard to assigned points by the NHF and clinical form of drug-induced skin reactions. This kind of analyses can make the cooperation between NHF and hospital more efficient. ■

REFERENCES:

1. Nationwide Campaign "Drug safety". Available from: http://www.urpl.gov.pl/lek-bezpieczny;[Accesed 15.06.2010]
2. Skibicka I., Maciejczyk A. Safety of pharmacotherapy and report adverse drug reactions. Neurol.Neurochir. Pol. 2004; 84: 503-10
3. Burbach GJ., Zuberbier T. Diagnosis of drug-induced skin reactions: a future role for computer-aided systems? Curr Opin Allergy Clin Immunol. 2011 Oct; 11(5): 451-6
4. Cost account of surgical remove a cataract phacoemulsification with intraocular lens implantation, edited by Paul Nawara, ethics, in 2010-2012 head of the Group for Selected Functions Systems NHF project leader DRG. Available from: http://www.medicalnet.pl/Pliki/Rachunek-kosztow-zacmy.pdf;[Acessed 07.01.2013]
5. Report adverse drug reactions. Available from:http://www.urpl.gov.pl/system/article_attachments/attachments/77/original/biuletyn.pdf?1282749647;[Acessed 07.01.2013]
6. Busse R., Geissler A., Quentin W., Wiley M. Diagnosis-Related Groups in Europe: Moving towards transparency, efficiency and quality in hospitals. Chapter five Swan Tan S., Serdén L., Geissler A., Ineveld M., Redekop K., Heurgren M. et al. Open University Press 2011; 59-74


TO OPEN
HOLD TAB DOWN
TURN