MACROECONOMIC POLICY IMPACT ON ONCOLOGY-RELATED PUBLIC EXPENDITURE IN AN EMERGING EUROPEAN MARKET – SIGNS OF EARLY RECOVERY

Aleksandar Dagovic [1], Ana Zugic [2] and Mihajlo B Jakovljevic [3]
[1] Oncology and Radiotherapy Center, Clinical Center Kragujevac, Kragujevac, Serbia
[2] Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia
[3] Department of Pharmacology and Toxicology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

UTICAJ MAKROEKONOMSKE POLITIKE NA JAVNA IZDVAJANJA ZA ONKOLOGIJU NA RASTUĆEM EVROPSKOM TRŽIŠTU – ZNACI RANOG OPORAVKA

Aleksandar Dagović [1], Ana Žugić [2] i Mihajlo B Jakovljević [3]
[1] Centar za onkologiju i radioterapiju, Klinički centar Kragujevac, Kragujevac, Srbija
[2] Fakultet medicinskih nauka, Univerzitet u Kragujevcu, Kragujevac, Srbija
[3] Katedra za farmakologiju i toksikologiju, Fakultet medicinskih nauka, Univezitet u Kragujevcu, Kragujevac, Srbija

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ABSTRACT

Healthcare financing in Serbia has faced many challenges over the past few decades. One of the most severe challenges is a global macroeconomic recession whose far-reaching consequences deserve particular attention from policymakers in cases of the most demanding major prosperity diseases, such as cancer. The objective of the study was to assess the precise cost matrix of oncology medical care and its chronological evolution during the key years of the macroeconomic recessionary period during 2010-2013.

A retrospective database of hospital discharge invoices was analysed, encompassing 37, 978 hospital admissions and 12, 505 patients during a four-year period. Insight into microeconomic patterns of consumption across groups of medical services was provided. A payer's perspective and one-year time horizon have been adopted.

Total hospital direct medical costs of cancer diagnostics and treatment in the observed tertiary care facility decreased from €7, 411, 446 in 2010 to €5, 715, 884 in 2012 and then increased to an extraordinary €8, 536, 364 in 2013. The costs of oncology nursing care, imaging diagnostics and radiotherapy have increased considerably while those of pharmaceuticals and surgery have decreased radically - completely transforming the resource allocation landscape of public cancer care.

The financial burden of cancer in Serbia is considerable and, unfortunately, expected to increase further in the coming years. Worldwide economic recession and consecutive domestic policy constraints of reimbursement limitations have heavily affected the affordability of cancer treatment for ordinary citizens. Promising signs of market recovery are clearly visible in 2013, which will likely improve both access and equity of medical care in Serbian oncology clinics.

Keywords: *Worldwide Crisis; Recession; Cancer; Costs; Economics; Health Financing; Health Policy; Reimbursement; Hospital; Serbia*

SAŽETAK

Cilj studije je analiza trendova u javnim izdvajanjima za onkolosku zdravstvenu zaštitu u godinama duboke ekonomske recesije u svetu i na Balkanu. Ostali ciljevi su utvrditi finu strukturu troškova u ovoj kliničkoj disciplini kao i eventualno prisustvo korelacije obima potrošnje na dijagnostiku i lečenje malignih neoplazmi sa makroekonomskim kretanjima i zdravstvenom politikom u Srbiji.

Primenjena je retrospektivna studija slučaja, kojom je obuhvaćen period od cetiri godine (2010-2013.) iz perspektive finansijera zdravstvene zastite i sa usvojenim vremenskim horizontom od godinu dana. Studija je izvedena na osnovu izvoda baze podataka o 37 978 epizoda bolničkog lecenja i 12 505 pacijenata sa klinički potvrdjenim kancerom pri regionalnom Centru za onkologiju i radioterapiju Kliničkog Centra Kragujevac.

Ukupni direktni medicinski troskovi dijangostike i lecenja kancera u posmatranom tercijernom centru su pali sa €7, 411, 446 u 2010 na €5, 715, 884 u 2012 i iznova snažno skočili na €8, 536, 364 u 2013. Glavni domeni troškova koji su najviše doprineli ukupnom obimu potrosnje su bili onkoloska medicinska nega, radioterapija i lekovi.

Finansijski teret kancera u Srbiji je ogroman i nažalost izgledno je da ce nastaviti da raste zahvaljujući nizu činilaca poput starenja populacije, boljeg preživljavanja, naraslih očekivanja građanstva o pravu na pristup naprednim metodama lečenja kao i dugoročno izvesnog rasta pokrivenosti stanovništva zdravstvenom zaštitom. Posebno masivni faktori su širenje dostupnosti metoda radioterapije i refundacija skupih bioloških lekova. Obećavajući znaci oporavka nacionalnog tržista će se, nadamo se, pretočiti u napore na poboljšanju pristupa i priuštivosti onkološke nege običnom građaninu.

Ključne reči: *Svetska ekonomska kriza; recesija; kancer; troškovi; ekonomija; finansiranje zdravstva; zdravstvena politika; refundacija; bolnice; Srbija*

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Correspondence: Mihajlo Jakovljevic, Department of Pharmacology and Toxicology, The Faculty of Medical Sciences, University of Kragujevac, sidartagothama@gmail.com

INTRODUCTION

Cost-of-illness analyses of the key prosperity diseases remain rather infrequent in Eastern Europe and the Balkans region (1). Over the past decade, a few pioneering assessments were published, laying the ground for the informed decision making of local health policymakers (2). These findings reflected the workload and financial burden imposed by the diagnostics and treatment of chronic obstructive pulmonary disease, community-acquired pneumonia, alcohol dependence, diabetes mellitus, hepatitis C, risky pregnancies and others (3-8). Another set of contributions revealed the considerable budgetary impact of some key medical technologies, such as medical imaging (9), radiotherapy (10) and monoclonal antibodies, applied in oncology (11-12). These and further on-going efforts on domestic, local health economic estimates are essential to improve the financial efficiency of our health system (13). This claim is supported by the well-known fact that similar estimates from high-income markets are not straight- forwardly applicable to clinical settings across Eastern Europe and the Balkans due to their substantially different histories, traditions and socioeconomic milieus (14-15).

Oncological morbidity deserves a particularly high place among the leading noncommunicable prosperity diseases. The diagnostics, treatment and rehabilitation associated with cancer are commonly much more demanding in terms of medical technology use and physician consultation time and frequency compared to other major illnesses. Additionally, the clinical outcomes of these interventions are far less predictable, with illness itself resulting in a heavily reduced life expectancy, quality of life and working ability of an individual citizen. Cancer's economic burden to the community is enormous, and the issue of treatment affordability remains high on the policy agendas of even the richest countries worldwide (16). Pioneering assessments in Serbia were published only recently and confirmed the aforementioned facts evidenced elsewhere (17).

Unfortunately, both global and European cancer prevalence and incidence are increasing (18). Serbia exhibits a slightly higher incidence compared to the EU average, which remains somewhat lower compared to the European average that includes the CIS countries and the Russian Federation (19-20). Among the most frequently cited reasons for higher oncological mortality in Serbia are poverty, unhealthy lifestyles and ecological contamination due to the Chernobyl disaster and wars in Yugoslavia during the 1990s (21-22). However, throughout Eastern Europe, poor implementation of screening procedures (23) and limited affordability of some innovative treatment technologies remain powerful contributors (24).

The global macroeconomic crisis has caused severe instability among the Western Balkan economies bordering the EU (25). The recession has compromised financial sustainability within the health sector (27), and its far-reaching consequences deserve particular attention from policymakers in cases of the most demanding major prosperity diseases, such as cancer (28). The core research question of this study was the assessment of the macroeconomic recession's impact on public medical spending mediated by national policy (29). Early signs of economic recovery, which have been present in Serbia since 2013, are likely to improve access to and the affordability of medical care for patients suffering from cancer. So far, targeted biological therapy reimbursement has remained one of the hottest domestic policy issues (30).

PATIENTS AND METHODS

To address the aforementioned research question, a retrospective, bottom-up, case series study design over a one-year horizon and payer's perspective was implemented (31). The tertiary care University of Kragujevac clinic allowed selective examination of their electronic database of discharge invoices. All patients whose cancer diagnosis was confirmed by clinical, imaging, laboratory and pathohistology findings and who were admitted and treated at the regional Oncology and Radiotherapy Centre were processed. Key cost drivers and determinants of resource consumption during oncological inpatient care were identified. Personal data remained protected during the study consistent with positive legislation on biomedical research in human subjects in Serbia via anonymous handling of patient files. A fine cost matrix was produced through stratification of the Republican Health Insurance Fund (RFZO) "Blue Code Book" of all medical goods and services provided within the national health system.

The patient sample recruitment period was January 2010-December 2013 and included inhabitants of this central Serbian region. Total sample size was 12, 505 patients or 37, 978 hospital admissions with assigned oncology treatment protocols during the 2010-2013 period. These years were selected because the 2010-2012 years were marked by the heavy impact of worldwide economic crisis, while 2013 was a year of slow but steady recovery of the national economy. To the authors' best knowledge, this sampling method and approach to longitudinal data is standard and common in the discipline of health economics (32).

RESULTS

Total hospital direct medical costs of cancer diagnostics and treatment at this tertiary university hospital fell from €7, 411, 446 in 2010 to €5, 715, 884 in 2012 and then increased to an extraordinary €8, 536, 364 in 2013. Costs of oncology nursing care, imaging diagnostics and radiotherapy have greatly increased while pharmaceuticals and surgery followed at a much slower pace, completely transforming the resource allocation landscape of public cancer care.

Most major service groups follow this general pattern, while pharmaceuticals and surgery differ from the dominant trend. Drug acquisition represented 56, 4% of total

costs in 2010 and 53, 3% in 2012. Cytostatics and immunosuppressants experienced a particularly steep decline in value-based turnover of 55, 4%, decreasing from €1, 699, 164 in 2010 to €758, 490 in 2012. Antibiotics, antiemetics, bone marrow stimulating factors and analgesics followed the same pattern. Among the few drugs that increased during the 2010-2012 period were monoclonal antibody costs, which rose by 20, 3% (from €1, 350, 235 in 2010 to €1, 624, 245 in 2012).

Radiotherapy costs also increased during the 2010-2012 period by 28, 1% (from €416, 193 to €533, 303), and this increase is unfortunately mostly a consequence of a higher workload produced by more frequent outpatient visits and inpatient admissions.

Decreased surgery-related costs should be attributed to the market decreases in the prices of consumables.

The radiology imaging, contrasts and films budget impact changed substantially from 3, 515, 050 RSD (€33, 319) in 2010 to only 1, 168, 519 RSD (€10, 276) in 2012, which is a nearly 70% decrease. Net savings acquired this way should be attributed to the new information system installed in the diagnostic services and clinic, which has eliminated the need for traditional roentgen films in most examination techniques. The value-based turnover across major cost domains over these four years is shown in detail in Table 1.

DISCUSSION

As indicated by the data above, some service groups show a sudden and clear upward trend in 2013, while others have followed at much slower pace. Thus, the big picture of resource allocation to cancer diagnostics and treatment in large hospitals in Serbia has evolved according to the macroeconomic landscape, market circumstances and official policies of the national authorities (13, 15, 29).

The 2010 dominance of drug acquisition costs (primarily conventional cytostatic, antiemetic, analgesic, hormonal and antibiotic drugs) is overtaken in 2013 by expanding radiotherapy, oncology nursing care and imaging diagnostics. This pattern is consistent with previously published evidence on the region stating that particularly serious budget impacts were imposed by over-utilization of high-tech radiology imaging procedures (11, 17, 24).

Pharmaceuticals were greatly influenced by novel, expensive biological treatments, such as monoclonal antibodies (mAbs) and protease inhibitors. This pattern is only small portion of far larger changes. One recently published study analysed official annual data from the national medicines agency (ALIMS) since 2004 (33). Total public expenditure on drugs with primary oncology-related indications increased by approximately five times during the period 2004-2012. During that same decade, public consumption of mAbs increased nearly 20 times due to the aforementioned societal and market changes (12). Although it is favourable that many patients had access to these innovative medicines, the cost-effectiveness of many mAbs is a source of heated international debate (34, 35). The societal affordability of expensive biologicals and willingness to pay thresholds are rather low in Eastern Europe compared to the West (13, 15). Contradictions such as shortages of basic, conventional cytostatics alongside reimbursement of most expensive medicines occur frequently (11, 12).

The downward slope of cytostatic drug acquisition costs from 2010 to 2012 in our regional sample has an underlying cause, which is invisible in the presented data. Unfortunately, due to pharmaceutical market disturbances across Western Balkan economies, during the last quarter of 2011 and the first five months of 2012, continuous hospital supplies of these drugs were severely threatened. These disturbances were mostly caused by delayed payments from state-owned health insurance funds to major multinational manufacturers supplying the region (13, 15). One particularly sensitive issue was the lack of simple 5-fluorouracil, which is itself a quite inexpensive medicine but is an essential part of many expensive and complex treatment protocols that could not be provided for months due to this shortage. Occasional shortages of cytostatic medicines also occurred. Consequently, clinics have experienced sudden decreases in their need for drugs used to treat the most common adverse effects of cytostatics, such as antibiotics, bone marrow growth factors and antiemetics used to treat febrile neutropenia, opportune infections and vomiting (36-38).

Another core influence of the sudden decrease in prescribing and dispensing of cytostatic drugs and their costs is the restrictive reimbursement policy imposed by the Republican Health Insurance Fund of Serbia (RHIFS), which was mostly triggered by the macroeconomic recession (39). The common practice is financial coverage of a particular medicine for select indications, such as narrowly defined malignant tumour clinical types, grades and stages, while the same drug might not be funded for another malignancy. Policies of funding agencies to prioritize interventions within their optimal clinical efficiency and cost-effectiveness were in place in many major markets around the globe (40-41).

The temporary decrease in oncology nursing care costs from 2010 to 2012 occurred immediately following domestic policy measures to allow contracted general practitioners to prescribe and administer opioid analgesics were implemented. This practice was uncommon within the national health system of Serbia. At approximately the same time, an outpatient pain treatment service was founded within this tertiary university clinic. Both measures ultimately resulted in less frequent hospital admissions due to severe metastatic pain, and patients used the opportunity to resolve their symptoms on an outpatient basis and preferred staying at home. That this strategy induces net savings while improving patient satisfaction and quality of life has already been observed elsewhere (42). The financial sustainability of home care in Serbia was recently an objective of thorough consideration (43).

Table 1. Cost matrix of oncology related diagnostics and treatment within tertiary university clinic of Kragujevac 2010-2013

COST DOMAIN	2010	2011	2012	2013
Number of patients diagnosed with confirmed malignancy				
Number of hospital admissions due to cancer				
Oncology related medical care				
Hospital Admission	1,118,074	1,102,027	950,470	988,679
Physician Consultations	50,800	63,924	42,386	215,942
Clinical Pharmacology/ Pharmacist services	27	309	115	
Rehabilitation services	355	2,408	1,462	1,153
Dialysis	868	493	373	754
Psychotherapy	83	12	8	709
Administrative expenses	138	154	135	295
All Other services (social care , transport, counselling, epidemiological	4,183	1,448	2,847	442,627
Total Cost of General - Oncology related medical care	1,174,533	1,170,776	997,796	1,650,161
Pharmaceuticals				
Antineoplastic agents and immunosuppresants	1,691,948	1,200,255	758,490	572,908
Monoclonal antibodies	1,344,501	1,432,796	1,624,245	1,559,090
Analgesics NSAID, opioid, others - pain control medicines	14,268	10,891	7,587	6,000
Antibiotics, antimicotics, antiviral and antiprotozoal drugs	170,376	111,822	78,586	104,546
Antiemetics	190,435	138,018	100,743	110,606
Parenteral and enteral nutritive solutions and systems	118,386	92,833	86,628	91,349
Hematopoietic colony stimulating factors	150,539	79,288	65,552	101,069
Antiandrogens , antiestrogens – therapy of steroid dependent carcinoma	153	10		
Blood and its derivatives – transfusions	155,917	111,031	109,201	60,997
All other drugs	345,498	306,273	218,122	264,412
Total cost for pharmaceuticals	4,182,025	3,483,217	3,049,154	2,870,977
Laboratory Analysis				
Classical Biochemistry and hemathology	296,599	295,276	190,453	291,817
Targeted cancer prevention screenings	71	83	13	1,576
Tumor marker detection			1,010	2,042
Pathohistology tests and cytology examinations	125,808	131,191	105,862	119,742
Immunodiagnostics, genetics, cell culture techniques	77,689	66,720	51,570	73,677
Law medicine and forensic services	15,217	16,586	16,125	31,043
Total cost for laboratory analysis	515385	509,856	365,033	519,897
Surgery				
Surgical Interventions	132,278	157,041	135,291	133,586
Nursing care and consumables	450,585	327,310	179,865	174,116
Total cost for surgery	582,863	484,351	315,156	307,702
Imaging diagnostics				
Classical imaging diagnostics – Röntgen	5,764	6,177	4,568	6,498
Contrasts, films and consumables intended for imaging diagnostics services	33,177	30,512	10,276	15,783
Ultrasound imaging examinations	6,577	7,369	7,295	9,032
Imaging diagnostics	221,555	231,005	174,272	358,947
Magnet resonance imaging	15,795	9,482	9,685	28,378
Nuclear medicine diagnostics and treatment	220,422	201,841	210,978	353,428
Total cost of imaging diagnostics	503,290	486,386	417,074	772,066
Interventional radiology				
Interventional neuroradiology services (both diagnostic and treatment)	1,055	837	1,902	2,378
Cardial interventional radiology	1,476	3,241	3,222	3,296
Urological interventional radiology	2,621	1,474	948	2,005
Vascular interventional radiology	1,160	571	151	357
Interventional radiology -other methods (biopsies, cyst punctuations, nonvascular int. etc)	206	356	13	366
Implants and consumables used in interventional radiology services (stents, tools etc)	32,407	35,032	32,131	44,944
Total cost of interventional radiology	38,925	41,511	38,367	53,346
Radiation treatment				
Teleradiotherapy procedures in Oncology	393,010	406,776	440,524	1,544,853
Brachyradiotherapy (intracavitary) procedures in Oncology	21,416	139,496	92,779	817,362
Total cost of radiation treatment	414,425	546,272	533,303	2,362,215
Total hospital cost (RSD)	785,227,937	703,434,811	650,000,662	978,626,707
Total hospital cost per patient (€)	2,087	1,640	1,547	
Total hospital cost (€)	**7,411,447**	**6,722,370**	**5,715,884**	**8,536,364**

Regardless of the weaknesses of these assessments in the field, it is crucial for policymakers to notice the enormous size and structure of public health expenditures on hospital in- and outpatient cancer care peculiar to the local setting (9-12, 17). Serbia will likely suffer from ongoing economic difficulties, such as increasing foreign debt, currency devaluation, high unemployment rates and inefficient healthcare financing (13, 15). A bold step forward was the introduction of national health accounts in the country based on similar World Health Organization practices in other regions across the globe (44). National health accounts (NHA) allow more precise knowledge of financial flows within the health system and international comparability of data (45). Economic and/or managerial inefficiency recognized via the NHA system might be selectively improved without affecting the availability or quality of services elsewhere in the system (46).

The most effective strategy to cope with the increasing burden of malignancies would likely be investment in population health education targeted to change risky health behaviours (47). Another rewarding investment is broad screening strategies whose cost-effectiveness has been well established in other countries (23). These strategies are particularly fruitful in some of the most prevalent carcinomas, which are curable by simple surgeries if discovered at early stages of clinical evolution (48). The early discovery of malignancies such as cervical, breast, colorectal, skin and gastric carcinomas prevents serious, expensive morbidities (49, 50). The outcomes and success of late treatment of advance disease forms, including surgery, complimentary radiotherapy, cytostatic protocols and occasionally novel biologicals, are highly unpredictable (24). Life expectancy is usually low, and premature mortality has enormous ethical and economic consequences for the community. Unfortunately, we are losing not only elderly citizens but also many people in their productive life stages (51).

Radiation treatments are major contributors to the total costs of care (9-10). Insufficient equipment capacities are common across the region (13, 15). Due to a poor network of facilities across rural and remote regions of the Balkans and difficulty accessing specialist care, many patients seek treatment too late (24). Late treatment involves multiple radiotherapy sessions with modest or poor success (52). Providing palliative, end of life care for advanced stage, metastatic disease is a more frequent practice compared to Western European and high-income settings (53). Absenteeism, decreased working ability and premature death are common (54-56).

It is crucial to emphasize that the aforementioned decreased cost of pharmaceuticals is not due to a decrease in the underlying prevalence and incidence of cancer or to successful public policy (17). Such savings are unfortunately largely a consequence of reimbursement limitations imposed by the national health insurance fund due to the macroeconomic recession (12, 13, 15). The considerable growth of overall resource use in oncology clinical care in 2013 may be a promising early sign of economic recovery (57).

Study limitations

Although representing a pioneering attempt in the field, which is essential for Western Balkan health policymakers, the study weakness slightly limit the generalizability generalisability of the conclusions. No indirect, absenteeism-related costs were calculated in this trial. If Grossman's human capital method was used, lost productivity, home care and premature mortality costs would likely nearly double current assessments (51, 58).

The retrospective approach used in this study was inevitable to acquire a large sample (31). Patient data on resource use (physician consultations, laboratory and imaging examinations, interventional radiology methods, surgical interventions, pharmaceuticals treatment, etc.) were acquired from clinical files. Therefore, important data on patients' clinical background was lacking. These are more likely to be provided within a prospective framework, which would assume much smaller sample (59). Further research should focus on the clinical outcomes of cancer treatment and assessment of cost-effectiveness, especially of medical technologies (60). This was primarily a cost of illness and budget impact estimate, and such efforts were well outside the scope and budget of this study.

CONCLUSION

Serbian public health expenditure on cancer was severely constrained by the reimbursement limitations imposed by authorities due to national consequences of the global economic recession. Slow but steady recovery is clearly visible according to the large increase in oncology related public expenditure in 2013, which was evidenced in a large domestic tertiary care university clinic. Under the assumption that GDP growth accelerates to pre-recession levels, policymakers should dedicate sufficient attention to improving the affordability and timely delivery of medical care to patients suffering from cancer. This is a key issue in a country with sizeable private out-of-pocket spending on healthcare. Properly targeted screening as well as efficient and accessible diagnostic and treatment services would likely achieve better clinical outcomes, such as improved patient longevity and quality of life. Health gains by citizens in need will provide a return on investment to society by enhancing national economic productivity.

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