Risk adjustment for the allocation of health care resources in Hungary

- development of the capitation payment formula -

Balázs Nagy

Supervisors: Dr. László Gulácsi, Dr. Miklós Szanyi

University of Debrecen

Doctoral School of Economics

Debrecen, 2009

Acknowledgements

I am very grateful to my parents for their continuous support throughout my studies. I would like to thank Ron Akehurst, József Bodrogi, Imre Boncz, Ágnes Brandtmüller, Alan Brennan, Csaba Dózsa, Zsófia Falusi, László Gilicze, Róbert Hornyák, Katalin Katona Jónásné, Zoltán Kaló, József Nagy, László Pál, Pál Rakonczai, Csilla Reszegi and Júlia Sipos for their scientific, moral and financial support during the thesis writing process. I would like to give my special thanks to Zoltán Kaló who peer reviewed the manuscript.

Internal defence:

Date: 8th December 2008

Venue: University of Debrecen, School of Economics and Business Administration, DE-KTK A/19 lecture room

Reviewers: Dr. Éva Orosz, Dr. Péter Pete

Chairman: Dr. Csaba Makó

Public defence:

Date: 20th February 2009

Venue: University of Debrecen, School of Economics and Business Administration, DE-KTK A/19 lecture room

Reviewers: Dr. Éva Orosz, Dr. Péter Makara

Chairman: Dr. Csaba Makó

Motivation of the research

The topic I chose for my research was influenced both by my family background and my professional career. Through assessments and essays during my undergraduate studies I became acquainted with the discipline of health economics, especially health insurance and technology assessment in health care. I started working at the National Health Insurance Fund Administration from 2000 where I was commissioned to develop the capitation payment method for pilot managed care organizations. This task required a thorough review of the related literature and drew my attention to the importance of improving Hungarian health care through risk adjusted capitation. My experience in England and the Netherlands gave further justification: the method of developing capitation payments in these countries had been examined for decades and research results have played a crucial role in health care decision making. A further motivation to my research was that adapting capitation based payments to the Hungarian health care system equally required the synthesis of a theoretical approach, methodological knowledge and practical skills. I was eager to know what the view from the "ivory tower" of science to everyday applications is. As the research progressed, the comprehensive review of the literature, the application of the methodologies and the unique health care environment delivered remarkably interesting answers to my questions.

Relevance

Efforts to reform health funding and the delivery of health care arise from concerns about cost escalation, which is a well-known policy concern in many developed countries. One common element in health care reforms is the application of prospective payments; this method allows the application of rigorous budget constraints to financed organizations. The prospective budgets are often allocated to health care organizations through the method of capitation. A well developed capitation methodology is regarded to improve the efficient and equitable allocation of health care resources. Either in competitive health care markets or centralized/decentralized public health care systems the development of the capitation methodology - often referred to as risk adjustment - has a crucial role in improving the health care system. Since the late eighties the topic of risk adjustment has been discussed in numerous health economic publications (special issues, supplements of international journals,

monographs, reports and book chapters), whereas in Hungary there have been very few research initiatives in this field. At the same time the allocation of health care resources has been increasingly designed according to rigorous budget constraints, efficiency and equity principles, and setting capitation payments to health care organizations has been considered several times in the last decades. Hence the need for developing capitation based resource allocation with a scientific accent is justified in Hungary and risk adjustment is regarded as an important instrument for the development of the health care system.

Aim and research questions

The aim of this research is to examine the possibilities of developing capitation based research allocation in Hungary with the instruments of health economics. The thesis thoroughly examines the questions that arise when developing health care capitation payment with the method of risk adjustment. A systematic review of fundamental resource allocation goals, an analysis of international and Hungarian capitation techniques, and the examination of Hungarian application possibilities are demonstrated.

A general aim of the research is to examine the possibilities of developing capitation payment that improves the efficacy and equity of the Hungarian health care system. On the one hand, this covers the review of the available scientific evidence and the interpretation of this evidence to the Hungarian context. On the other hand it incorporates the exploration of risk adjustment techniques and health care characteristics that sufficiently describe health care needs − in order to develop capitation payment formulae for Hungary. The following research questions have been formulated:

1. Are there adequate conditions in Hungary to develop capitation based health care resource allocations through the use of risk adjustment?
2. Do health based risk adjustment methods, such as for example risk adjustment for COPD and risk adjustment for dialysed patients, contribute to the improvement of the capitation based resource allocation in Hungary?

A synthesis of theoretical and empirical evidence provides answers to the above research questions. Therefore I examined the following:

- the aims of capitation based resource allocation
- risk adjustment methods that help achieve resource allocation goals
- the possibilities of developing risk adjusted capitation payment in Hungary
- the development of capitation payment through two specific practical examples

– the potential impacts of introducing a new capitation payment formula to the Hungarian health care system.

Method

To answer the questions and test the hypotheses a comprehensive literature review was carried out on (i) the characteristics of health care resource allocation, with special interest to capitation, (ii) the efficacy and equity goals of risk adjustment, and (iii) the methodology of risk adjustment. These notions were thoroughly discussed in the context of the Hungarian health care system, as well. Beyond the review of the literature empirical analyses were performed to assess the applicability and feasibility of risk adjustment methodologies in Hungary. With patient level health care utilization data risk adjustment models were developed for COPD and dialysis treated patients. Based upon findings of the literature review various qualitative and quantitative risk adjustment techniques were applied and disease specific algorithms were developed. This contained patient selection methods that use diagnosis and pharmaceutical information, regression and statistical sampling techniques to estimate and predict health care expenditures and qualitative methods to help choose through different models and explanatory variables. During the model building process there was a special focus on avoiding multicollinear variables, which was handled with an iterative model building procedure; bootstrapping method was used to assess the predictive power of the models that were using only single year information. In the qualitative analyses criteria developed by Rice and Smith on the usefulness of risk adjustment variables were elaborated to specify the variables' plausibility, confidentiality, vulnerability to manipulation, incentives for gaming and cream skimming, verifiability, consistency and availability. Since the majority of the risk adjustment variables were associated with health care utilization it was imperative to avoid data manipulation and incentives for over- and/or underuse of services. Therefore in both patient models variables that were potentially less vulnerable to provider misbehaviour or data manipulation were preferred. As people's access to health care services markedly differs in Hungary there was a danger that models, relying overwhelmingly on utilization data, reflect people's access to health care services rather than their needs. To overcome this problem in models for dialysis the patients' distance from their provider was analysed, whereas in the COPD models the joint use of information from different services (in-patient, outpatient services and pharmaceutical utilization) was used. The empirical analyses were conducted with SPSS for Windows 14.0 and R 2.6.0 software packages.

Findings of the literature review

Resource allocation and risk adjustment

Government intervention in the health care market often leads to the reallocation of resources that is driven by at least two arguments, equity and efficiency (Musgrove 1999). An important method is strategic resource allocation that is used to distribute national health care funds to organizations (e.g. insurers, sickness funds, primary care trusts) responsible for arranging health care on behalf of their population (Rice and Smith 2001). In many developed countries capitation finance is the favoured strategic resource allocation instrument, because this helps the most achieve resource allocation goals. Capitation has desirable incentives for less costly production, but undesirable incentives for risk selection (Newhouse 1998). The crucial element of capitation payments is the calculation of expected expenditures depending on individuals' personal characteristics; a process often referred to as risk adjustment. Theoretically, the best strategy to reduce selection is the application of good risk adjustment methodology (van de Ven and Ellis 2000).

Efficiency and equity

To develop risk adjusted capitation payment the two main resource allocation goals are considered. With regard to efficiency, production efficiency and three dimensions of allocative efficiency (Mossialos and Dixon 2002) should be carefully examined. For risk adjustment, the most important principle is the allocative efficiency of health care services across different health care interventions. Equity arguments when designing capitation can be viewed as (i) people should enjoy equal access to health care according to their needs (horizontal equity) and/or (ii) resource allocation should contribute to the reduction in avoidable health inequalities of the population (vertical equity) (Hauck et al 2002). When a choice has to be made across the different efficiency and equity principles a trade-off is usually unavoidable.

Risk adjustment

Risk adjusters can generally be considered under two broad categories: a) health based adjusters that have direct relationship with health care costs (i.e. diagnosis, pharmaceuticals, utilization) and b) non health based adjusters that have indirect relationship with health care costs (i.e. demographic, social, economical factors) (Nagy et al 2004). During the process of risk adjustment variable selection and model estimation are based on regression based statistical analyses. Yet the goal of risk adjustment is not accuracy per se, but rather to provide the financed organizations with appropriate incentives, fair distribution of resources

and a feasible financing approach. The factors of risk adjustment should be universally recorded, consistent, verifiable, free from perverse incentives, not vulnerable to manipulation, consistent with confidentiality requirements, and plausibly determinative of service needs (Rice and Smith 2001). An important characteristic of capitation setting is that it implies setting priorities and rationing access to health care provisions. It is therefore a profoundly political process that should be considered throughout the development of risk adjusted capitation (Smith 2003).

Main research results, theses

Capitation based resource allocation in Hungary

First thesis: Developing capitation payment in Hungary through the method of risk adjustment sufficiently contributes to the efficacy and equity of health care resource allocation. The preconditions of this statement are that (i) resource allocation should be designed through prospective budgets and to organizations that purchase health care for predefined populations, and (ii) resource allocation should focus on improving allocative efficiency and ensuring (equal) health care according to (equal) needs. The proposed factors of risk adjustment are demographic (age, gender) variables, health based adjusters and geographical indicators. On the short and middle run risk adjustment is recommended to be complemented with risk sharing strategies.

Cost containment and the promotion of equity and efficiency are equally important policy goals in the Hungarian health care system. Similarly to other developed countries Hungarian governments have been trying to control cost escalation with rigorous budget constraints and a prospective budget setting process. Although these efforts have positively affected several aspects of efficiency in health care, allocative efficiency within the system has shown very little improvement. This phenomenon is largely explained by the fact that the allocation system is broken down to isolated sub-funds where health care services are financed through performance based payment mechanisms. This environment encourages health care providers to enhance their productive efficiency and increase the number of services (i.e. hospital or outpatient visits), but offers very little incentives to improve the allocative efficiency of the health care system. The problems of inefficient allocation across health care providers cannot easily be dealt with through the current allocation mechanism and it is viewed that the current financing structure rather hampers than helps the efficient allocation of resources. A potential solution to improve allocative efficiency can be the introduction of a comprehensive financing

method that covers a wide range of health care provisions in a single allocation scheme. This is accomplished by the capitation method.

The requirement for efficiency is well recognized by the Hungarian health care regulation, although the different dimensions of efficiency and their role in planning the system are not determined by law. Therefore, prior to the introduction of any resource allocation formula (i.e. capitation) it will be important to define the role and the nature of efficiency goals. As a result of the application of performance based financing mechanisms the improvement of production efficiency has been successful in many aspects in Hungary (Szigeti 2007, Gaál 2004), meanwhile the improvement of allocation efficiency is hampered by the subdivided financing structure. In this situation the priority of improving allocative efficiency is firmly recommended. During the last decade health care reform proposals suggested that the establishment of managed care type organizations (i.e. competing health insurance funds, publicly owned health care funds, other types of health plans) and their financing through capitation ought to have an essential role in improving the allocative efficiency of the health care system (Goglio 2005, Evetovits 2004,Orosz 2001). Hence, introducing and developing capitation payment for strategic resource allocation purposes has the potential to improve the allocative efficiency of the health care system.

Horizontal equity, defined as equal access to equal needs is a fundamental resource allocation principle in the Hungarian health system. Despite the wide public support of this notion there are large inequities in the access to health care services. The population's needs across different regions are not particularly reflected in the current provider structure: in certain areas people have better access to health care (than in other areas) and this difference is particularly apparent between rural and urban regions (Orosz 2001, Goglio 2005). As a result the allocation of health care resources is regarded as inequitable in many aspects (Takács et al 2006, Boncz et al 2006, Szaszkó et al 2006). During the last decades health system reforms have shown few attempts to improve the equity of access in health care and prevailing governments have not been able to significantly improve the health state of the population with the instruments of resource allocation. This is firstly because the need of various populations (social groups, geographical areas etc.) could not be correctly determined; secondly the financing instruments were not capable of allocating resources according to need, thirdly because the supply of health care services was influenced by political and historical considerations. An important tool to improve equitable resource allocation could be the use of appropriate measures of health needs that should be defined by weighted capitation, and apply resource allocation targets accordingly. Thus, both equity and efficiency goals are

strongly supported by the introduction and the refinement of the capitation payment in Hungary.

The majority of the data and tools for risk adjustment are readily available in Hungary. Beyond demographic risk adjusters the use of individual morbidity data (health based adjusters) and geographical indicators (non-health based adjusters) are foremost recommended. As morbidity data are potentially biased by differences in health care utilization patterns, the correction of supply side effects and the implementation of rigorous quality control measures have to be considered when designing health based risk adjustment. On the other hand, geographical indicators are recommended to be linked with individual (and not with aggregated) health care expenditures to circumvent the problem of misinterpreting statistical results (e.g. ecological fallacy). Altogether a hybrid capitation model is suggested that embodies different types of risk adjusters and compromises between the theoretically best performing but potentially biased health-based adjusters and the less accurate but more credible non health-based adjusters. It has to be noted that although equity and efficiency in the health care system can be improved with the use of risk adjusted capitation it should be blended with several complementary strategies. An important dilemma is that the reallocation effect of any capitation payment formula (even a perfect one) would be too large in comparison to the current health spending patterns and such reallocation across regions would threaten health care delivery (Nagy et al 2007). Hence risk sharing elements have a dominant role during the early implementation of the capitation payment system. As risk sharing effectively reduces the organizations' incentive for risk selection, but also reduces their incentive for efficiency, the role of risk sharing should always be balanced with the improvement of the capitation formula.

Development of the capitation formula in Hungary

Second thesis: Health based risk adjustment methods such as risk adjustment for COPD and risk adjustment for dialysed patients achieve a more efficient and more equitable allocation of resources in Hungary. The precondition of such a statement is to build models in which (i) the selected risk groups are clinically meaningful and generally recorded in the health care financing system; the proposed risk adjusters (ii) are capable of preventing data manipulation, (iii) encourage the provision of services in line with clinical guidelines and (iv) adjust for geographical differences. During the model building process (v) data quality, (vi) appropriate complementary regulatory schemes and (vii) stable health care financing prices need to be applied.

In order to answer the second research question empirical analyses were carried out on patients with Chronic Obstructive Pulmonary Disease (COPD) (Nagy et al 2008) and dialysis treated patients (Nagy et al 2005). The two separate analyses showed that under predefined conditions the improvement of the capitation formula is practically applicable with the use of health based adjusters. With the application of morbidity, utilization and demographic data COPD patients were successfully split into 2-16 risk groups; dialysis patients were broken down to 2-10 risk groups. These subgroups aimed to reflect the population's different levels of health care needs.

In the case of COPD patients an important characteristic of model building was the use of high cost in-patient service information, while outpatient and pharmaceutical data also made a small, but significant contribution to predicting health care expenditures. In models for dialysis treated patients fewer observations were available (for the analysis), but services and patients could easily be broken down to homogenous (i.e. high cost and low cost, acute and chronic patients) risk groups. Consequently, in the case of dialysis patients risk adjustment was simpler; there were fewer risk groups and relatively higher cost differences (between patient groups); but (because of the relatively small sample size) the uncertainty around the cost predictions was somewhat greater compared to the COPD analysis. In models for COPD patients the high number of patients with heterogeneous risk profiles made the model building process to some extent more complicated, but predictions (mainly because of the numerous observations and variables) contained less uncertainty. In both patient groups models were relying on data that was sensitive to manipulation by providers and variables carried the potential to stimulate unintended provider behaviour. The magnitude of this hazard was difficult to estimate; categorical and binary variables and the monitoring of services and data collection were proposed to handle these deficiencies. Another important finding of the analysis was that in both patient groups access to health care services could be corrected with either geographical variables or through the use of information gained from different types of services.

The statistical performance (predictive power and explanatory power) and the quality (Rice-Smith criteria) of the models were good, which implies that if all other model building conditions are satisfactory the developed capitation models will reflect the true health care needs of the examined populations. Therefore my empirical analyses underline that:

a) the development of the capitation formula is applicable in Hungary and risk adjustment with the use of demographic, morbidity and utilization data is attainable in the selected populations.

b) since it was found that the models estimate the two patient groups' needs well, the risk adjustment process is regarded successful and the proposed capitation models are considered to improve the efficient and equitable allocation of resources.

According to the findings of the empirical analysis there were important methodological criteria of reaching the desired resource allocation goals. The improvement of the efficient and equitable allocation depended upon the following predefined model building requirements: one needs to build models in which (i) the selected risk groups are clinically meaningful and generally recorded in the health care financing system; the proposed risk adjusters (ii) are capable of preventing data manipulation, (iii) encourage the provision of services in line with clinical guidelines and (iv) adjust for geographical differences; during the model building process (v) data quality, (vi) appropriate complementary regulatory schemes and (vii) stable health care financing prices need to be applied. If these border conditions were fulfilled, the proposed models would be able to improve the efficient and equitable allocation of health care resources.

Final conclusions

The main results of my research prove that in Hungary there are suitable conditions for the improvement of capitation based resource allocation with the method of risk adjustment. Based on the review of the literature, resource allocation goals can be well defined and these goals are interpretable to the Hungarian context. To help define resource allocation goals recommendations were made, but one needs to remember that the specification of the resource allocation principles in the current health system is not the subject of this work, rather the responsibility of decision makers. The aim here was to present the consequences of choosing and prioritizing between different resource allocation goals and define their potential role when developing capitation payment formulae. The empirical research proved that the conditions for the practical use of risk adjustment are also satisfactory in Hungary. The quality and the quantity of data offer good (or even better) conditions in comparison to other developed countries. Health based risk adjustment methods for COPD and dialysis patients have been tested and resource allocation goals were proved to be achieved through the improvement of the capitation formula. An important finding was also that without following a definite set of methodological rules and completing certain model building criteria, the results could lead to wrong resource allocation decisions. Thus, the empirical analyses and the elaborated border conditions together underline the findings of the literature review and specify the answers to the research questions. The literature review and the

empirical analyses answered the research questions of the thesis from a variety of perspectives and offered solutions for the application of risk adjustment in Hungary in numerous ways.

References *(used in the thesis summary)*

Boncz, I., Takács, E., Szaszkó, D., Belicza, É. (2006): Az OEP krónikus fekvőbeteg szakellátási kassza igénybevétele. Területi egyenlőtlenségek I. Kórház, 12, 37-43.

Evetovits, T. (2004): Célok és eszközök összehangolása az Irányított Betegellátási Rendszerben: az információs aszimmetria problematikája. Informatika és Menedzsment az Egészségügyben, 3, 11-15.

Gaál, P. (2004): Hungary. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on Health System Policies.

Goglio, A (2005): In search of efficiency: improving health care in Hungary. No. 446 ECO/WKP(2005)33. Organisation for Economic Co-operation and Development, Economics Department. Working papers.

Hauck, K., Shaw, R., Smith, P. (2002): Reducing avoidable inequalities in health: a new crietrion for setting health care capitation payments. Health Economics, 11, 667-677.

Mossialos, E. és Dixon, A. (2002): Funding Health Care in Europe: weighing up the options. In E. Mossialos, A. Dixon, and Kutzin J (Eds.), Funding health care: options for Europe (pp. 273-300). Open University Press .

Musgrove, P. (1999): Public spending in health care: how different criteria related? Health Policy, 47, 207-223.

Nagy, B., Dózsa, C., Boncz, I. (2004): A fejkvótaszámítás továbbfejlesztésének lehetőségei az irányított betegellátási rendszerben. Egészségügyi Gazdasági Szemle, 42, 15-24.

Nagy, B., Falusi, Z., Boncz, I., Dózsa, C., Gerendy, P. (2005): A művesekezeltek ellátása Magyarországon 2000-2003. Egészségügyi Gazdasági Szemle, 43, 32-37.

Nagy, B., Rakonczai, P., Gulácsi, L. (2008): Statisztikai módszerek a fejkvóta számítására a magyar egészségügyben. Statisztikai Szemle, 86, 321-341.

Nagy, B., Sipos, J., Nagy, J. (2007): Illusztrációk a fejkvótás forrásallokáció számításához Magyarországon - még csak a logikát ismerjük... Informatika és Menedzsment az Egészségügyben, 6, 6-13.

Newhouse, J. P. (1998): Risk adjustment: where are we now? Inquiry, 35, 122-131.

Orosz, É. (2001): Félúton vagy tévúton? Egészségügyünk félmúltja és az egészségpolitika alternatívái . Egészséges Magyarországért Egyesület.

Rice, N. és Smith, P. (2001): Capitation and risk adjustment in health care financing: an international progress report. The Milbank Quarterly, 79, 81-113.

Smith, P. (2003): Formula funding of public services: an economic analysis. Oxford Review of Economic Policy, 19, 301-322.

Szaszkó, D., Boncz, I., Belicza, É., Takács, E. (2006): Az OEP krónikus fekvőbeteg szakellátási kassza igénybevételének területi egyenlőtlenségei. Magyar Epidemiológia, 3, 223-233.

Szigeti, S. (2007): A magyar egészségügyi társadalombiztosítás teljesítményének rendszerszintű értékelése a hatékonyság szempontjából. Egészségügyi Gazdasági Szemle, 23-32.

Takács, E., Belicza, É., Szaszkó, D., Boncz, I. (2006): Az OEP járóbeteg szakellátási kassza igénybevételének területi egyenlőtlenségei. Informatika és Menedzsment az Egészségügyben, 5, 15-22.

van den Ven, W. és Ellis, R. (2000): Risk adjustment in Competitive Health Plan Markets. In Newhouse J P and Culyer A J (Eds.), Handbook of Health Economics (pp. 757-845). Elsevier Science.

Author's publications

Book Chapter - Hungarian

Nagy B, Dózsa Cs: "Az egészségbiztosítás" 10. fejezet In: szerk.: Gulácsi L: "Egészség-gazdaságtan" 2005, Medicina Könyvkiadó, Budapest. („Health Insurance" Chapter 10 In: edt.: Gulácsi L: „Health Economics" 2005, Medicina Könyvkiadó, Budapest)

Publication in English

Nagy B, Brandtmüller Á: Implementing risk adjusted capitation payments with health care reforms in Hungary, Competitio, 2008; 8:2 147-160

Publication in Hungarian

Nagy B, Rakonczai P, Gulácsi L: Application of statistical methods to calculate capitation payments in the Hungarian health care. Hungarian Statistical Review (Statisztikai Szemle) 2008 – 86:4 321-341

Nagy B, Rakonczai P, Sipos J: Predicting health care expenditures with demographic characteristics for designing capitation payments in Hungary. Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2008; 7:Egészség-gazdaságtani különszám 5-9

Nagy B, Sipos J, Nagy J: Illustrations for the calculation of capitation payments in Hungary – yet we only have the logic… Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2007; 6:10 5-13

Szalai Á, Nagy B, Szalai P: Creating a competitive health insurance market in Hungary. Governance, Public Finance, Regulation (Kormányzás, Közpénzügyek, Szabályozás) 2007; 2:1 37-73

Nagy B: József Dézsy: Health economics with a small difference – the irrationalities. Mistakes and illusions of the health system. Public Finance Quarterly (Pénzügyi Szemle) 2006; 51:4 501-504

Nagy B: Development of capitation payment system – Theory and practice of developing capitation based resource allocation modells in Hungary. Egészségügyi Stratégiai Kutatóintézet, Discussion Paper. February 2006.

Brandtmüller, Á., Nagy, B., Dózsa, Cs., Gulácsi L, Boncz, I., Pékli M.,: Priority setting in health care – the contribution of economics. Economic Papers Series, Corvinus University of Budapest, 2006; 1:1

Nagy B, Skultéty L, Udvardi A, Modelling the cost effectivness of Lamotrigine in the treatment of bipolar depression – tha case of Hungary Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2006; 5: 1: 28-36

Nagy B, Bodrogi J Innovation in the Pharmaceutical Industry – End of a golden era? I-II Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben), 2005; 4: 8: 27-31, 2005; 4: 9: 43-48

Nagy B, Falusi Zs, Boncz I, Dózsa Cs, Gerendy P Dialysis treatment in Hungary, 2000-2003 Health Care Management Review (Egészségügyi Gazdasági Szemle) 2005; 43:5: 32-37

Gulácsi L, Nagy B, Weyvara V „Androgen suppression therapies in the treatment of prostate cancer" Health Care Management Review (Egészségügyi Gazdasági Szemle) 2004; 42: 4: 33-41

Dózsa Cs., Nagy B., Borsos K., Muszbek N., Boncz I.: Current questions in health economics Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben), 2003. 2: 7: 24-29.

Csedő Z, Nagy B, Dobák M, Dózsa C, Gulácsi L. New models in the model - Managerial challenges in the Hungarian managed care model Orvosi Hetilap. 2003 Jun 8;144 (23):1135-43.

Boncz I, Dózsa Cs, Nagy B Hungarian Managed Care: role and methodology of capitation payment Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2003; 2, 6: 15-19.

Boncz I, Dózsa Cs, Nagy B Hungarian Managed Care: managed care in the UK and methods in managed care Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2003; 2, 5: 10-13.

Boncz I, Dózsa Cs, Nagy B Hungarian Managed Care: managed care's role in the reimbursement system, basics and the example of the USA Journal of Informatics and Management in Health Care (Informatika és Menedzsment az Egészségügyben) 2003; 2, 4: 19-23

Gulácsi L, Brandtmuller A, Lepp-Gazdag A, Nagy B, David T, Hagymasi J Checklist for health technology assessment reports, Health Care Management Review (Egészségügyi Gazdasági Szemle), 2003;41:1-2:52-58

Nagy B, Dózsa Cs Hungarian Managed Care Pilot Program - Experience and further developments Health Care Management Review (Egészségügyi Gazdasági Szemle) 2002; 40: 4: 480-492

Nagy B, Dózsa Cs Experiences in the Hungarian Managed Care Pilot Program, Health Care Management (Egészségügyi Menedzsment), 2002. 13: 5: 13-18.

Nagy B, Gulácsi L, Lőke J Professional and critical technology analyses represent quality - Niedzica, 2000. Health Care Management Review (Egészségügyi Gazdasági Szemle) 2001; 39: 2: 140-144

Nagy B, Gulácsi L, Szilasi M The health economic aspects of asthma bronchiale in Hungary between 1998-1999 and expected tendencies. Health Care Management Review (Egészségügyi Gazdasági Szemle) 2000; 28: 6: 636-652

The author had 6 oral presentations on international conferences, 4 oral presentations on Hungarian conferences, 9 poster presentations on international conferences.

Notes: