

The Information Management into the Greek Health System

Sofia Voutsidou^{*,†,1}, Evaggelos Moraitis², Aris Sissouras³, Eleni Jelastopulu⁴, Georgios Charalampous⁵

¹University's General Hospital of Thessaloniki, Thessaloniki, Greece Administrative Officer, MSc in Health Management

²Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus

³Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus

⁴Department of Public Health, University of Patras, Patra, Greece

⁵Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus

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1 INTRODUCTION

The present era has caused very important and speedy changes in the field of informatics technology, rendering the assistance of several electronic applications in the provision of health services essentially valuable, in collaboration with other scientific fields (law, finance, psychology, sociology). This multidisciplinary approach contributed to the orientation towards total quality management [1] with a view to offering optimal healthcare with the lowest possible cost [2]. Moreover, it has played a part in the adoption of modern management practices, strategic planning and open governance, which are mainly characterized by the values of transparency, efficiency, equality and the ensuring of quality services which correspond to user expectations, who are becoming the principal target of the health system [3].

Keywords

information management, electronic programs, interoperability, Greek health system

2 AIMS

The promoting of open electronic governance leads to the reconfiguration of the health field as well, which is called upon to respond to the contemporary challenges to curtail incurred expenses, promote effectiveness and also increase in satisfaction for users of health services [4]. The volume of information that is transmitted on a daily basis in the sensitive field of health, constantly increases [5]. In order to exploit it, there is a demand for a management system which will ascertain the communication between various health professionals, the collaboration of individual sectors between them and the final making of right, and at the same time rapid decisions [6]. This paper aims to investigate the contribution of the electronic information management of

electronic online programs implemented through health IT, in the Greek hospital management. More specifically, after listing the most important electronic programs used in the Greek Health System, it intends to highlight the utility of these programs, the question of their further exploitation through interoperability and to highlight issues that are a challenge for modern health systems, as highlighted from the review of contemporary literature.

3 MATERIALS AND METHODS

The methodology followed consists of a review of the relevant Greek and foreign-language, printed and electronic bibliography, in libraries and authoritative databases.

Theory/Calculation

Health Informatics

Health Informatics comprises a vigorous and developing field in the contemporary health system and its role is constantly upgraded. It copes with the thorough processing of data, information and knowledge which arises in the healthcare sector from time to time, with their best possible utilization as a primary goal [7]. Health Informatics, exploiting the technology of electronic computers and telecommunication networks, is related to and immediately affects hospital management, as well as the functions of designing planning, inspection and evaluation of hospital units and health centers [8].

The concept of Hospital Management

Hospital Management refers to the skill of administration of health organizations, which are regarded as intricate systems of increased administrative complexity [9]. Hospi-

tal Management is inextricably connected to the upgrade of their functional/ administrative ability as well as their clinical functioning through the establishment of optimal structures and procedures. The management of medical institutions is called upon to solve a difficult equation: on the one hand to counterbalance the unlimited needs which exist in users of health services and, on the other hand, the limited resources -both material and human ones- that every health system possesses [10]. Moreover due to the organizational complexity of hospitals, to learn how to transform intentions into actions and meaningful outcomes [11]. It also puts emphasis on the productive effectiveness and the rational use of the provided services and goods [12] with a simultaneous quality preservation, without ignoring the anthropocentric orientation and the social character of healthcare [13].

The online management of information

A powerful connective link between health informatics and hospital management is the information itself, which due to its major significance was characterized by Wolper as “the currency of the twenty-first century” [14]. Since information management is given prominence to as a matter of essential importance, the role of informatics in the health system is intensified, while it is gradually changing from peripheral to vital and from supportive to strategic. This role will be upgraded further more in the nearer future since the use of artificial intelligence is expected to give more qualitative features to information management. The concept of open e-Government according to Alexopoulos[15], concerns the utilization of electronic means available, so as to achieve interaction between government bodies and businesses or citizens. The main concern is the provision of thorough services, which will be guided by reliability and consistency, while being able to offer the directly concerned party, clear facilitation regarding the services that have to do with them, limiting bureaucracy [16]. The applications of health informatics have as a goal the introduction of informative units and systems in administration, facilitating hospital management.

The online management of information is pursued for limitation of bureaucratic procedures, faster provision of medical healthcare, financial control and cost containment. Health informatics can combine individual units into a uniform information system, which is widely available to users. This way, the need of multiple retention of piecemeal files is invalidated and the followed procedures are systematized and redesigned [17]. Nevertheless, it is stressed with emphasis that the human capital continues to possess the most important part and to influence the utilization of information systems decisively, co-shaping their operation [18].

4 RESULTS

Electronic programs at the service of the Greek Health System

As Yfantopoulos has highlighted, the health systems comprise “the spine of the social state” in every country [19].

They were created and developed during the last fifty years, as in some cases they were put to trial by severe economic crises and social disputes and in other cases they entered an orbit of modernization and reform, retaining their public character. The Greek health system essentially comprises, as Kyriopoulos and Beazoglou said, “a mixture of an “integrated” Beveridge type system and of a “contractual” type or “compensation” Bismark type” while its operation is regulated by the central administration using cost and productivity criteria [20].

The Greek healthcare system, as healthcare systems of most countries besides, is faced up against accumulated problems in the citizen’s relations with the services (responsiveness, quality, accessibility) and the need for rationalization and utilization of the available resources of the system [21]. For the venture of handling the conflicts of the Greek health system -both on the level of institutional set-up and a functional/ business level- plenty of electronic programs are used. These have been designed aiming at the organizational and administrative unification of health services, the provision of timely, effective and easily accessible services, as well as the simultaneous reinforcement of the mechanisms of surveillance, control, evaluation and feedback [22].

Electronic programs essentially comprise information systems that is a total of different components which interact with one another for the gathering, the processing, the storage and distribution of information available. Their ultimate goal is the production of data, which are useful and necessary for a full and comprehensive awareness. Their operation is based on a network of computers and it exploits the modern achievements of science and technology. Their components are the people involved (operators and users), the procedures followed and the equipment being used (material, software, data). The last few years, electronic programs are materialized in the Greek health system, within the Greek framework of open government e-GIF (Electronic Government Interoperability Framework) and e-management of the information, specifying the commands of the European action eEurope 2005-eGovernment and the program eEurope-i2010 [23]. Among these programs are included: (1) the electronic networking program called “Clarity” (in Greek: “Diavgeia”), (2) the electronic program called originally “ESY.net” and then “BI.Forms”, (3) the “Price Observatory” of the Central Committee for Health Supplies of the Greek Ministry of Health, (4) the electronic prescription, (5) the electronic patient record (EPR) and (6) the Diagnosis Related Groups (DRGs). The first three programs have been designed exclusively for the Greek administrative and economic sector in hospitals, in order to improve the efficiency and effectiveness of the services provided but also the clinical functioning of the healthcare institutions, while the other three electronic programs already being implemented in a lot of European states, among them the pioneers Denmark, the Netherlands, United Kingdom, Estonia, Sweden, Finland and Germany [24].

Specifically, in the electronic program of “Diavgeia”, the total of the administrative and financial activity of all the

public sectors is posted mandatorily (L. 3861/2010) – including health organizations. There is the exception of the topics which are connected with the national security of the state and the sensitive personal data, which are not made public. This way, it is ensured that the decisions that are taken are characterized by transparency and that both citizens-users and health professionals can access them freely. The actions and the decisions of the public organizations are not allowed to be carried out unless they have been posted beforehand on the platform of the program. After the finalization of the post, every administrative and financial decision is automatically coded and obtains a single Number of Online Posting (NOP) which comprises its “identity” from then on. Thus, it can be searched in an easy and simple way, especially understandable and user-friendly. The implementation of “Diavgeia”, in public hospitals achieves a wide and sustained flow of administrative, operational and clinical information by establishing a new administrative philosophy and culture with the emphasis given on open governance, accessibility and the emergence of good practices. This improves the classical administrative process and facilitates the expansion of the existing ways of communication, while enhances control, streamlining time-consuming bureaucratic rigidities and enables effective coordination of staff and activities [25].

The program “ESY.net” (“BI.Forms”) is a specialized electronic program of interoperability and single statistical processing of financial and operational data of hospitals as well as of Health Centers and Regional Offices belonging to their area of responsibility. It is also a powerful mechanism for controlling and consolidating a more efficient and productive health service management. “ESY.net” that was further developed into “BI.Forms”, includes electronic collective charts, in which the financial and functional data of public healthcare institutions are inserted on a monthly basis -in a single and uniform way- thus allowing the central administration of the Greek Ministry of Health to have direct and valid information on the prevailing situation of all health units [26]. In other words, financial charts reflect the monthly budget implementation (revenue/ proceeds, expenses/ payments), the purchases of consumable and healthcare materials, reagents and pharmaceutical preparations, the consumption of materials and medication per division and per doctor, the treatment fees monitoring, as well as the monitoring of the payroll and the number of employees in active employment. The operational charts monitor the work output (healthcare activity per clinic and per unit, occupancy, examinations conducted, surgeries, patient admissions) in combination with the available human capital, producing the necessary indicators [27]. The implementation of “ESY.net” (“BI.Forms”) serves the Benchmarking technique, facilitating the continuous process of comparative measurements and inter-company comparisons, the extraction of comparative data per hospital and per health district -also serving as indicators of their performance assessment- and the standardization of the best procedures.

The “Price Observatory” is an innovative electronic health program which functions centrally under the authority of the Committee for Supplies of the Greek Ministry of Health. It is an electronic database where the prices at which hospitals were supplied with the essential for their proper functioning materials, items and medical equipment, are registered by them. Since for the provision of all items a uniform encoding is applied, the lowest price achieved is recorded in each code and that is in effect on a panhellenic scale as a quota, while it refers to the system and the hospital which configured it [28]. Thus, a better monitoring of the supplies is accomplished and competitiveness is reinforced for the ensuring of better prices and expenditure restraint. In addition, the Committee for Supplies of the Greek Ministry of Health and the public sector bodies are provided with the possibility of systematic comprehensive monitoring of the stocks and disposals of all registered materials and medical devices by type.

The electronic uniform medication list consists of the available approved pharmaceutical preparations, their cost and the amount of their forecast compensation. The program of electronic prescription enables the electronic entries of prescriptions on the part of the doctors with the help of individual codes [29]. The promoted policy of opting for generic medicinal products (that is, the copies of medicinal products) instead of the expensive prototypes as well as the mandatory prescription of the active substance and not the commercial name of the medicine contributes to the counterbalance of the cost and the desirable effect [30]. As a result, both the curtailment of the pharmaceutical expense and the electronic monitoring of prescription behavior in real time, become feasible with the administering of more economical generic medicinal products [31].

The electronic patient record or otherwise called electronic health file comprises an individual electronic list, where medical data that concern the patient are entered and kept (admission date for treatment, time of healthcare, laboratory and private clinic examinations that were conducted, medication and other therapeutic interventions, information on the charges of provided services, previous services offered as well as acute incidents reports). This electronic file is available to any healthcare institution and authorized doctor, aiming at the right diagnosis and the limitation of medical errors [32]. Thus facilitates the distance medical advice, while at the same time it makes the e-prescribing, possible. Furthermore, it contributes to the correct monitoring of patients, the elimination of multiple sign-ups in the system, the limitation of operational cost (e.g. avoidance of pointless examinations, charge facilitation, distribution of funds in relation to the diagnosis and treatment), while at the same time it creates an “e-library” that is also useful for research purposes [33]. The benefits towards a better health care and healthcare management are evident, while the debate on the preservation of patient’s privacy still remains an open issue. As the data included in the patient’s medical records are among the most sensitive personal data (main disease, history of current disease, allergies and drugs, medical history, family history, social history, professional

history, sexual history, addiction to drug use, other substances, etc.), every aspect of security, confidentiality and protection must be adequately ensured [34].

The DRGs (Diagnosis Related Groups) are a system of “compensation prospect” of the health services provision sectors, where payment is defined depending on the classification of patients in similar diagnostic categories. Every patient who is admitted for treatment, is classified in a specified and pre-costed diagnosis [35], while the expense is paid to the health organization by the insurance agency. The grouping of patients aims at the improvement of the effectiveness and efficiency of health services, through the rationalization of treatment duration, and the materialized diagnostic and therapeutic activities [36]. The implementation of this technique, in addition to rationalizing the length of hospitalization of the patients in hospitals, also helps in cost control, due to the avoidance of many and mostly unnecessary examinations. The total fee is based on the initial diagnosis, secondary diagnoses, the diagnostics and therapies used, the age of the patient, the sex and the reason for leaving the hospital. Patient grouping can help in their rapid recovery, but a number of factors such as the risk of placing a patient in a more expensive diagnostic group or doing overwhelming diagnosis and treatment, as well as prematurely leaving the hospital before the completion of the planned treatment must be also taken into account [37].

The aforementioned electronic programs ascertain the constant flow of administrative, operational and clinical information within the health system. In addition, they unify, automatize and speed up the followed procedures, reducing both time and expense required. However, they mainly solidify a new administrative philosophy and culture with an emphasis on open government, accessibility, accountability and best practice bench marking. This way, they contribute to the dissemination of knowledge and the balanced relationship between citizens-users and health professionals, enhancing the feeling of trust and cooperation. With their application, the wide dispersion of information is achieved through horizontal communication and organization patterns, with the interconnection of all health bodies of the public sector, promoting essentially the main goals of hospital [38].

5 DISCUSSION

The wager of interoperability

Interoperability refers to the ability of different systems to interact, so as to achieve mutual benefits and the agreed upon common goals, through the exchange of information, knowledge and data. Health organizations, in order to increase their efficiency and effectiveness, readapt hospital management, utilizing various instruments and applications, the benefits of which are maximized through the interoperability and the creation of a uniform electronic grid of programs, which comprises the main concern. The interconnection and interoperability of the separate electronic programs can configure a uniform information network of

health and e-government, with the pursued outcome of optimal services provision through the implementation of a new organizational and governance model. In 2012 the European Commission, through the Directorate-General for Health of the European Union, adopted common rules of procedure for the implementation of the e-Health network in European countries, aiming at interoperability and uniform evaluation [39].

6 CONCLUSIONS

From this literature review arises the systematic utilization of informatics applications by health professionals during the last few years, with the transition to the extensive networking and complete networking systems which depend on the collaboration idea and multiple ways of access, based mainly on the possibilities that the Internet provides[40]. This way, the organizational structure of the information system of a health institution -combined with the available infrastructure, organization and the followed methods of circulation and exploitation of the produced information- is numbered among the most significant investments which a health unit is called upon to make [41].

Especially the case of Greece gets a great interest since the implementation of electronic programs coincided with the turbulent years of the economic crisis. Thus, information technology was used as a challenge and a tool to reduce hospital operational costs and to promote reforms in the direction of upgrading health services. Primary results are encouraging, as the available data show that the operational costs of hospitals have been reduced, while on the other hand the electronic upgrade of the administrative sectors of the hospitals affects positively, especially in the areas of transparency and patient confidence.

The usage of electronic Internet programs under no circumstances substitutes the hospital surroundings and the conventional way of healthcare provision. On the contrary, it leads to the reinforcement and the further expansion of health services both regionally and temporally, as well as regarding the speed, availability, operability, monitoring and curtailing cost potentials, the degree of participation and awareness and service improvement. In order for the above goals to be fulfilled, it is vital that reconfiguration and modernization are attempted. Health organizations must adopt a complete and flexible administrative/ financial model of governance, adapted to the contemporary demands of their external but also internal environment, which will pursue to optimize the offered services in the field of health through the exploitation of the available electronic applications.

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REFERENCES

- [1] M. Balasubramanian, Total Quality Management [TQM] in the Healthcare Industry – Challenges, Barriers and Implementation Developing a Framework for TQM Implementation in a Healthcare Setup, *Science Journal of Public Health*. 4(2016) 271-278; A. Tzortzopoulos, Implementation of the principles and tools of Total Quality Management in the health-care sector – guarantee of quality improvement of hospitals and the National Health System, *Archives of Hellenic Medicine*. 35(2018) 649-664.
- [2] M. Rekleiti, M. Tananaki, P. Kyloudis, Health expenditure in the Greek healthcare system: an international comparison, *Perioperative Nursing*. 1(2012) 3-14.
- [3] C. Pollitt, G. Bouckaert, Public Management Reform. A Comparative Analysis, 2nd edition. Oxford University Press, Oxford, 2004; Ch. Boursanidis, Comparative health policy: governance structures and management tools in EU health systems, in: X.I. Kontiadis, K.N. Souliotis (Eds.), *Institutions and health policies*. Papazisis, Athens, 2010, pp. 249-297.
- [4] K. Lenk, R. Traummuller, Broadening the Concept of Electronic Government, in: J.E.J. Prins (Ed.), *Designing e-Government*, 2nd edition. Kluwer Law International, Amsterdam, 2001, pp. 63-74; K. Buse, N. Drager, S. Fustukian, K. Lee, Globalization and health policy: trends and opportunities, in: K. Lee, K. Buse, S. Fustukian (Eds.), *Health policy in a globalising world*. Cambridge University Press, Cambridge, 2002, pp. 251-280.
- [5] A. Wager, K. Lee, F. Wickham, P.J. Glaser, *Health Care Information Systems: A Practical Approach for Health Care Management*, 3rd edition. Jossey – Bass, San Francisco, 2013.
- [6] J.R. Raymond, E. Jordan, *Systems Development: A Project Management Approach*. Leyh Publishing LLC, USA, 2002; E. Hovenga, R.M. Kidd, S. Garde, C. Cossio, Health Informatics - An Introduction, in: E. Hovenga, R.M. Kidd, S. Garde, C. Cossio (Eds.), *Health Informatics. An overview*. Ios Press, Amsterdam, 2010, pp. 9-15.
- [7] S.R. Gordon, J.R. Gordon, *Information Systems - A Management Approach*, 3rd edition. Wiley, Hoboken, 2004.
- [8] M. Papadakis, *Computer Applications in Health Services*, in: K. Souliotis (Ed.), *Politics and Economy of Health. Strategic Planning-Organisation and Management-Economic Operation-Sectoral Policies*. Papazisis, Athens, 2006, pp. 223-284.
- [9] G.B. King, Organizational Actors, Character, and Selznick's Theory of Organizations, in: M.S. Kraatz (Ed.), *Institutions and Ideals: Philip Selznick's Legacy for Organizational Studies (Research in the Sociology of Organizations, Volume 44)*. Emerald Group Publishing Limited, Bingley, 2015, pp. 149-174.
- [10] L. Liaropoulos, *Organization of Services and Health Systems*. Vita Press, Athens, 2007.
- [11] A. Kentikelenis, M. Karanikolos, I. Papanicolas, S. Basu, M. McKee, D. Stuckler, Health effects of financial crisis: omens of a Greek tragedy, *The Lancet*. 378(2011) 1457-1468.
- [12] H. Bakola, E. Fradelos, E. Bakola, S. Zyga, Health care reforms and changes in health expenditure in a period of financial crisis, *Archives of Hellenic Medicine*. 35(2018) 549-557.
- [13] V. Chalkia, A. Varaklioti, Health and social protection expenditure in Greece and the EU – member states, *Archives of Hellenic Medicine*. 32(2015) 546-555.
- [14] L.F. Wolper, *Health Services Administration: Hospital under a Scheme Organized Care Providers*, Vol. 2. MediForce, Athens, 2001.
- [15] Ch. Alexopoulos, *Interoperability of Information Systems. Field Theoretical Analysis and Documentation*, Bachelor's Thesis. Aegean University, Karlovasi, 2011.
- [16] E. Manouselis, *eGovernment: Definition, Interoperability, Current situation in Greece*, 2012, [http://nemertes.lis.upatras.gr/jspui/bitstream/10889/6292/3/Nimertis_Manouselis\(mech\).pdf](http://nemertes.lis.upatras.gr/jspui/bitstream/10889/6292/3/Nimertis_Manouselis(mech).pdf). Accessed March 1 2019.
- [17] A. Tzikopoulos, I. Apostolakis, *Electronic Administration and Communication in Health Units*, in: I. Apostolakis (Ed.), *Management Information Infrastructure Issues in Health Units. Selected texts with special agenda of the 6th Panhellenic Scientific Conference Management of Health Services*. Mediocre, Athens, 2005, pp. 115-129; E.J. Sullivan, P.J. Decker, *Effective Leadership and Management in Health Services*, 6th edition. Giourdas Publications, Athens, 2009.
- [18] K. Terzidis, K. Tzortzakakis, *Human Resources Management (Personnel Administration)*. Rosili, Athens, 2004.
- [19] G.N. Yfantopoulos, *The economics of Health. Theory and Policy*. Publications Typothito, Athens, 2006.
- [20] G. Kyriopoulos, T. Beazoglou, Networks integrated healthcare: An attempt for the comprehensive approach to health reform, in: E. Georgousi, G. Kyriopoulos, T. Beazoglou (Eds.), *Integrated care networks in health*. Themelio, Athens, 2000, pp. 15-35.
- [21] K. Souliotis, J. Papadonikolaki, M. Papageorgiou, M. Economou, The impact of crisis on health and healthcare: thoughts and data on the Greek case, *Archives of Hellenic Medicine*. 35 (2018) 9-16.
- [22] I. Apostolakis, K. Mastrogianni, *Electronic Services in Health: Functional and Technical Framework*, in: D. Niakas (Ed.), *Health Services, Management and Technology. Selected texts of the 5th Panhellenic Scientific Conference Management of Health Services*. MediForce, Athens, 2004, pp. 209-226.
- [23] D. Soumplis, K. Poulis, *Online open data applications for the Greek public administration*, Bachelor's Thesis. Aegean University, Samos, 2012.
- [24] O. Moerer, A. Schmid, M. Hofmann, A. Herklotz, K. Reinhart, K. Werdan, H. Schneider, Direct costs of severe sepsis in three German intensive care units based on retrospective electronic patient record analysis of resource use, *Intensive Care Medicine*. 28(2002) 1440-1446; K. Thiru, A. Hassey, F. Sullivan, Systematic review of scope and quality of electronic patient record data in primary care, *British Medical Journal*. 326(2003) 1070; A. Boonstra, D. Boddy, M. Fischbacher, The limited acceptance of an electronic prescription system by general practitioners: reasons and practical implications, *New Technology Work and Employment*. 19(2004) 128-144; W. Bocking, U. Ahrens, W. Kirch, M. Milakovic, First results of the introduction of DRGs in Germany and overview of experience from other DRG countries, *Journal of Public Health*. 13(2005) 128-137; T.B. Jensen, M. Aanestad, How Healthcare Professionals “make sense” of an Electronic Patient Record Adoption, *Information Systems Management*. 24(2006) 29-42; L. Salmivalli, H. Hypponen, P. Nykanen, P. Ruotsalainen, M. Pajukoski,

Testing a theoretical framework for interdisciplinary IT evaluation: The case of Finnish Electronic Prescription, *International Journal of Healthcare Technology and Management*. 8(2007) 42-65; M.L. Hetland, DANBIO – powerful research database and electronic patient record, *Rheumatology*. 50(2010) 69-77; European Commission, eHealth in the EU: what's the diagnosis? http://europa.eu/rapid/press-release_IP-14-302_en.htm. Accessed March 2 2019.

[25] National School of Public Administration, Evaluation report of the application "Clarity" program, 2011. http://www.enap.gr/attachments/article/7311/teliko_diavgia.pdf. Accessed March 2 2019.

[26] N. Polyzos, A three-year Performance Evaluation of the NHS Hospitals in Greece, *Hippokratia*. 16(2012) 350-355.

[27] C. Kastanioti, N. Polyzos, Hospital performance evaluation based on ESY.net in public hospitals, *Archives of Hellenic Medicine*. 33(2016) 198-206.

[28] N.M. Polyzos, Management and Organization of Health Services. Kritiki, Athens, 2014.

[29] A.A. Dhavle, M.T. Rupp, Towards creating the perfect electronic prescription, *Journal of the American Medical Informatics Association*. 22(2014) e7-e12.

[30] S. Xanthopoulou, K. Katsaliaki, Evaluation of generic drug use in the Greek market during the financial crisis, *Archives of Hellenic Medicine*. 33(2016) 583-595.

[31] M.P. Gagnon, E.R. Nsangou, J. Rayne-Gagnon, S. Grenier, C. Sicotte, Barriers and facilitators to implementing electronic prescription: a systematic review of user groups' perceptions, *Journal of the American Medical Informatics Association*. 21(2014) 535-541.

[32] E. Oborn, M. Barrett, E. Davidson, Unity in Diversity: Electronic Patient Record Use in Multidisciplinary Practice, *Information Systems Research*. 22(2011) 419-484.

[33] A.M. Uslu, J. Stausberg, Value of the electronic patient record: an analysis of the literature, *Journal of Biomedical Informatics*. 41(2008) 675-682.

[34] N. Mathai, M.F. Shiratudin, F. Sohel, Electronic Health Record Management: Expectations, Issues and Challenges, *Journal of Health and Medical Informatics*. 8(2017) 1-5.

[35] N. Mihailovic, S. Kocic, M. Jakovljevic, Review of Diagnosis-Related Group-Based Financing of Hospital Care, *Health Services Research and Managerial Epidemiology*. 3(2016) 1-8.

[36] E.J. Sullivan, P.J. Decker, *Effective Leadership and Management in Health Services*, 6th edition. Giourdas Publications, Athens, 2009.

[37] A. Heerey, B. McGowan, M. Ryan, M. Barry, Microcosting versus DRGs in the provision of cost estimates for use in pharmacoeconomic evaluation, *Expert Review of Pharmacoeconomics & Outcomes Research*. 2(2002) 29-33; N. Goldfield, The Evolution of Diagnosis-Related Groups (DRGs): From Its Beginnings in Case-Mix and Resource Use Theory, to Its Implementation for Payment and Now for Its Current Utilization for Quality Within and Outside the Hospital, *Quality Management in Health Care*. 19(2010) 3-16.

[38] T. Spil, R. Stegwee, Strategies for Healthcare Information Systems, in: A. Armoni (Ed.), *Effective Healthcare Information Systems*. IRM Press, Hershey, 2002, pp. 1-12.

[39] European Commission, Health and Consumers Directorate-General, Rules of Procedures of the eHealth Network, 2012, https://ec.europa.eu/health/sites/health/files/ehealth/docs/rules_procedures_ehealth_network_en.pdf. Accessed June 12 2019.

[40] L. Eder, *Managing Healthcare Information Systems with Web Enabled Technologies*. Idea Group Publishing, Hershey, 2000.

[41] R.B. Saltman, V. Bankauskaite, K. Vrangbaek, *Decentralization in Health Care: Analysis and Outcome*. Open University Press, London, 2007.

AUTHOR BIOGRAPHY

Sofia Voutsidou University's General Hospital of Thessaloniki, Thessaloniki, Greece Administrative Officer, MSc in Health Management

Evaggelos Moraitis Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus

Aris Sissouras Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus

Eleni Jelastopulu Department of Public Health, University of Patras, Patra, Greece

Georgios Charalampous Department of Health Sciences-PhD in Health Management, Frederick University, Nicosia, Cyprus