ISSN (online) 2300-0813 ISSN 2543-6597

Ekonomia i Zarządzanie
Economics and Management

Engineering Management in Production and Services

Volume 9 Issue 2 2017

Bialystok University of Technology

International Society for Manufacturing, Service and Management Engineering

ISSN 2543-6597

Bialystok University of Technology
Faculty of Management

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ISMSME
International Society for Manufacturing, Service and Management Engineering

Engineering Management in Production and Services

Volume 9 • Issue 2 • 2017

www.empas.pb.edu.pl

Frequency

ECONOMICS AND MANAGEMENT
is published quarterly since 1998

As of the beginning of 2017 the journal
is published under a new name:
ENGINEERING MANAGEMENT
IN PRODUCTION AND SERVICES

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Publisher

Bialystok University of Technology
Wiejska 45A, 15-351 Bialystok, Poland

The International Society
for Manufacturing Service
and Management Engeneering (ISMSME)

Submission

Papers for submission should be prepared according to the *Authors Instructions* available at www.empas.pb.edu.pl

All papers should be submitted through the electronic submission system

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Indexation

Journal is indexed in EBSCO Business Source Ultimate (Complete), Index Copernicus, ERIH PLUS, Google Scholar, Central European Journal of Social Sciences and Humanities, Research Papers in Economics (RePEc), BazTech and BazEkon databases

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1. Increasing the share of foreign reviewers and the improvement of the evaluation process of papers submitted to "Ekonomia i Zarządzanie" journal ("Economics and Management") (currently "Engineering Management in Production and Sevices");
2. Increasing the share of foreign scholars in the Scientific Board of the "Ekonomia i Zarządzanie" journal ("Economics and Management") (currently "Engineering Management in Production and Services");
3. Amelioration of the English language version of "Ekonomia i Zarządzanie" journal ("Economics and Management") (currently "Engineering Management in Production and Services");
4. Improving the mechanism of securing the originality of texts published in "Ekonomia i Zarządzanie" journal ("Economics and Management") (currently "Engineering Management in Production and Services")

– tasks financed in the framework of the contract no. 819/P-DUN/2017 by the Ministry of Science and Higher Education from the funds earmarked for the public understanding of science initiatives.

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Editorial

Applying management rules to a decision-making process remains a central principle in the modern health care around the world, yet many health professionals find it challenging to acquire published research knowledge.

Evidence-based decision-making in the strategic and operational activities of health care provision are predicated upon the capability to identify, acquire and apply relevant research knowledge. On the other hand, the international literature shows the underuse and slow adoption of heath research in practice[1].

Therefore, in this issue, we report on several research findings dedicated to health care management. Our objective was to present improvements to their management activities to make effective and sustained evidence-based practices easier and more available. This issue reports on both research conducted in Poland as well as empirical findings coming from abroad (Germany and Portugal). We present microeconomic studies referring to finance and strategic management as well as findings conducted the from macro-level perspective. The presented papers highlight the most prominent issues of modern health care, especially dedicated to the efficiency and quality improvements. We hope that health managers will find them useful in their everyday practice.

Iga Rudawska
Guest Editor

[1] Pentland, D. et al. (2014). Enabling integrated knowledge acquisition and management in health care teams. *Knowledge Management Research & Practice*, *12*(4), 362-374.

Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 15 January 2017
accepted: 10 June 2017

pages: 8-20

Cross-border health care in the European Union: evaluation of different financing arrangements

Walter Ried, Frauke Henriette Rau

ABSTRACT

This paper analyses the impact of the financing arrangements for planned cross-border health care within the European Union. A financial arrangement is taken to provide a financial incentive but may also involve payment risks and administrative burden. For the pathways given by the Social Security Regulations (883/2004 and 987/2009) and the EU Directive 2011/24/EU, we investigate how the associated financial arrangements act on providers, patients and on publicly funded health insurance. First, the Regulations can induce cross-border health care that will increase domestic health care expenditure and may threaten national health policy by setting an incentive for patients to go abroad for health care not covered by domestic health insurance. Second, the financial arrangement of the Directive may induce cross-border health care which will lower domestic health care expenditure. However, due to considerable payment risks and administrative burden on both pa-tients and providers, these benefits will not be reaped in full. Moreover, in the presence of national cost containment policies, the Directive may provide an incentive for cross-border health care that is too strong. Finally, due to the requirement to pay upfront, the financial arrangement also suffers from a lack of equity of access to health care provision abroad.

KEY WORDS

financing arrangement, cross-border health care, national health policy

DOI: 10.1515/emj-2017-0009

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Introduction

In recent years, the European Union (EU) has been in the news primarily because of problems that appear to question the value of this alliance of states at least for some of its members. E.g., in 2016 the British people voted to leave the EU ("Brexit"). Even though the result came about with only a small margin, it is possible that other Member States may be tempted to follow this route. Furthermore, some member states of the EU currency union, most notably Greece, have been or still are suffering from problems of fiscal sustainability to such an extent that substantial financial assistance is necessary to prevent fiscal insolvency. Thus, eventually Greece or other Member States may choose or even have to leave the EU currency union.

While these problems undoubtedly exist, they should not distract from the fact that the EU has been quite successful in several ways which is indicated by the steady increase in membership over the last decades. A good example is given by the European Single Market which is associated with the "four fundamental freedoms". More specifically, these comprise the free movement of goods (e.g., medicinal products), the freedom to move for workers (e.g., health care providers), the freedom to establish and provide services (e.g., health insurance) and full capital mobility (e.g., investment in health care infrastructure). These freedoms act to promote trade in goods and services to enhance the welfare of citizens in the EU Member States.

Applying this line of reasoning to health care, one would, therefore, expect cross-border health care to occur on a substantial scale within the EU. Confining attention to patient flows, this would imply patients going abroad to obtain care of a higher quality, or to skip national waiting lists, or to incur lower costs. At first blush, it is not difficult to find evidence of such flows, e.g., German patients travelling to Poland or some other Eastern European Member State for dentistry or dentures, or patients from Poland going to Czechia for cataract surgery. In fact, turning to the case of the United Kingdom (UK) where health care provision has been notorious for long waiting lists, it is easy to find media reports with country-specific recommendations as to where patients from the UK may receive health care without delay and at a considerably lower cost than at home.

Nevertheless, the available empirical evidence clearly shows that, for the large majority of Member States, cross-border health care currently constitutes a rather limited phenomenon (European Commission, 2015b; European Commission, 2016). Given that, as described below, patients' entitlements have been enhanced recently, the small scale of patient flows across borders within the EU is even more surprising. Indeed, health care provision and financing differ substantially among the EU Member States and, since the Treaty on the Functioning of the European Union acknowledges the right of each Member State to organise its own health care system, these differences can be expected to persist. In turn, this implies that cross-border health care may offer considerable benefits (Ried & Marschall, 2016). On the other hand, several barriers can be identified which inhibit patient flows across national borders. Moreover, if a significant number of patients were to go abroad for health care in a Member State, this would pose a threat to the viability of the health care system in that state. Finally, access to health care in another Member State will differ across patient groups. Thus, cross-border health care involves difficult issues relating to the trade-off between equity and efficiency which may call for a restrictive approach.

In the present paper, we take up these issues with respect to the financing arrangements of cross-border health care within the EU. Since the bulk of health care typically is financed by a third party, a financing arrangement has an effect not only on patients and providers but also on health insurance funds or, alternatively, on a national health service. More precisely, attention will be confined to the case of planned health care as this involves, at least in principle, an element of choice by the patient which may be influenced by, e.g., the size of his copayment. Essentially, there are two pathways to cross-border health care in the EU at the moment. For each pathway, we will investigate the impact of financing arrangements upon the patient, the providers, and upon the health insurance funds or the national health system. Our objective is to work out the associated incentives for these actors to examine to what extent the financial arrangement may act to promote cross-border health care. Building on these results, we will also look briefly at feedback effects upon national health policy, with particular attention on cost containment policies.

The plan of the paper is as follows. Section 1 prepares the ground by exposing the two principal financing arrangements which are available in the EU. In section 2, we evaluate the impact of these arrangements upon the main actors. Section 3 contains a discussion of our results while we offer our conclusions in the final section.

1. Financing arrangements for cross-border health care: the case of planned health care

In general, cross-border health care denotes a broad concept which includes every transaction with either a patient, a service, or a provider moving across national boundaries (Wismar et al., 2011, p. 2). As mentioned above, our analysis will be confined to patients of an EU Member State who consider going to another Member State to receive health care. More specifically, we shall assume public funding, i.e., we

take the patient to be covered either by statutory health insurance (SHI), e.g., as in Germany, or by a national health fund (NHF), e.g., as in Poland. While this imposes some restriction, the case of public funding involves no substantial loss of generality because only a minority of individuals in the EU has private health insurance. In addition, coverage by SHI or NHF patients is more interesting as it has more implications for national health policy.

Let us briefly look at the two types of health insurance underlying our analysis of cross-border health care. As a benchmark, we will rely on the associated financing arrangements for domestic patients. Characteristically, statutory health insurance is financed by contributions levied upon individual income or upon parts thereof. Due to competition among SHI funds, coverage of health care is based upon membership. Thus, an individual will typically be able to prove to providers that he/she is entitled to receive health care covered by his SHI fund, e.g., by means of a health insurance card.

As for the provision and financing of health care, consider a patient who receives health care which is covered by his health insurance. If SHI is based entirely on the benefits-in-kind principle as, e.g., in Germany, the patient does not have to pay the provider except for a copayment (Busse & Blümel, 2014, pp. 140-157). Rather, the provider will obtain the remuneration directly from the SHI fund of the patient. On the other hand, in some Member States SHI is based to some extent on the cost reimbursement principle as in, e.g., France for outpatient care. Then, the patient must pay the provider upfront and then turn to his/her fund for restitution (Chevreul et al., 2015, p. 93). Nevertheless, even in this case some types of health care, e.g., hospital care, will be financed relying on benefits-in-kind. Hence, below we will focus on SHI based on the benefits-in-kind principle.

Things are somewhat different for a national health fund as the example of the National Health Service (NHS) in England shows. Essentially, the NHS is financed by general taxes and domestic patients are entitled to receive all health care covered by the NHS for free (Cylus et al., 2015, pp. 50-54). More generally, patients who are ordinarily resident in the UK are exempt from charges by the NHS (Department of Health, 2016, pp. 29-33). This implies that providers such as, e.g., GPs or hospitals, will get their services remunerated by the NHS according to the going tariff. Thus, the financing arrangement is broadly similar to the one for a SHI based on the benefits-in-kind principle. However, there is no established procedure for patients to prove that they are entitled to receive health care on behalf of the NHS simply because this is not necessary for ordinary residents of the UK.

Among overseas patients, there are several subgroups to which different rules of charging are to be applied. In principle, the NHS is responsible for identifying the rules applying to a particular patient and for taking steps which are necessary to recoup the associated cost of treatment. In line with this, providers are supposed to try to obtain that information and to report it whenever necessary (House of Commons, Committee of Public Accounts, 2017; Department of Health, 2016; Guidance or National Audit Office, 2016, p. 13). In theory, if providers fail to meet this requirement, they may not obtain remuneration for their services. In practice, however, there is no established procedure to deal with overseas patients as foreseen in the statutory provisions. Thus, if a provider does not identify an overseas patient, the services are very likely remunerated just like for an ordinary NHS patient.

In what follows, the term financial arrangement will be taken to refer to all financial aspects relating to the utilisation of cross-border health care by a patient who is covered by either SHI or NHF. In the first place, this includes payments by patients, remuneration of providers and reimbursement by SHI or NHF. For evaluation, however, it is useful to adopt a wider perspective. Hence, we will also consider further issues such as the availability of information on payments and any uncertainty that may be associated with these.

Essentially, for a patient there are two pathways to obtain planned health care in another EU Member State: the first is based upon Social Security Regulations, in particular on Regulation 883/2004 in conjunction with Regulation 987/2009, while the second relies on the EU Directive 2011/24/EU. Both pathways differ with respect to the entitlement to care, procedural issues and the financial arrangement. In line with the focus of our paper, we shall only touch upon the first two aspects and concentrate on the latter aspect. To fix ideas, suppose a patient from a Member State A (the Member State of affiliation) intends to obtain planned health care in some other Member State B (the Member State of treatment).

1.1. The Social Security Regulations route

Consider first the pathway given by the Social Security Relations. Basically, in this case, both coverage of treatment and financing follow the rules governing health care provision by SHI or NHF in the Member State of treatment. This implies two restrictions: First, the treatment must be part of the corresponding benefit package in state B, and, second, it must be performed by a provider under contract with SHI or NHF. Furthermore, to be able to embark on this pathway, the patient must obtain prior authorisation from his health fund at home, i.e., in the Member State of affiliation. More specifically, prior authorisation can be refused if the requested treatment either does not belong to the benefit package of the SHI fund or the NHF at home or when it is readily available there. On the other hand, if the treatment is included in the benefit package but cannot be obtained without undue delay in the Member State of affiliation, prior authorisation must be granted.

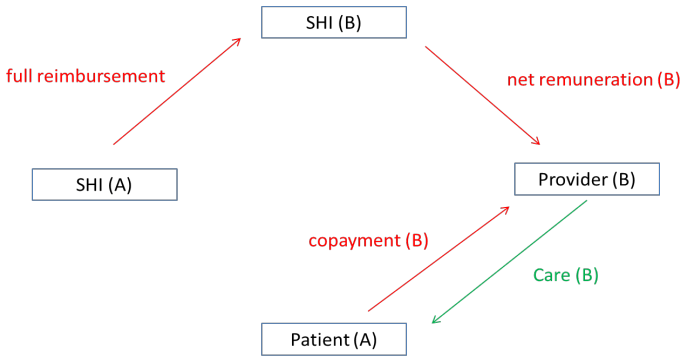

Fig. 1. Financing of cross-border health care — social security regulations

Turning to the financing arrangement, there is a considerable similarity with the financing arrangement associated with the provision of health care to a domestic patient covered by a public fund in Member State B. More precisely, this is true for the remuneration of providers, the copayment of the patient and the reimbursement by SHI or NHF of Member State A. More specifically, providers must apply the same tariff as for patients covered by SHI or NHF in Member State B. In the end, remuneration is split between the patient and his health fund in Member State A such that the patient must bear the same copayment as a domestic patient in Member State B. Technically, this is achieved by a specific form (S2) indicating to the provider that the patient is covered by SHI or NHF at home.

In what follows we will assume that SHI or NHF in Member State B relies on the benefits-in-kind principle to financing health care[1]. Whereas this is characteristic of an NHF, it is true for SHI in, e.g., Germany. Thus, whenever a patient utilises health care included in the benefit package, a SHI fund or the NHF of Member State B will directly remunerate the provider net of the copayment which is delivered by the patient. In effect, the public funder of Member State B acts as a financial intermediary who then has to turn to the patient's health fund in Member State A for reimbursement (Fig. 1). Without any loss of generality, we assume public funding to occur by SHI in both Member States.

It is possible that the cost to SHI or NHF in the Member State of affiliation is lower than the cost which would have arisen if the patient had been treated at home. Then, the patient may apply for additional reimbursement which will be granted at the discretion of a SHI fund or the NHF in the Member State of affiliation. In effect, while reducing the financial burden on the patient, this additional payment must not exceed the cost savings to SHI or NHF from cross-border health care.

1.2. The Directive route

Another pathway to cross-border health care is offered by the EU Directive 2011/24/EU which has been passed in 2011 and was to be transposed into national law by October 2013. More specifically, the Directive codifies, to a large extent, case law which had been established earlier in several rulings by the European Court of Justice. In this case, both coverage of treatment and financing follow the rules governing health care provision by SHI or NHF in Member State A, i.e., the Member State of affiliation. In particular, care obtained in another Member State B will be funded if it belongs to the benefit basket at home. With respect to providers, the Directive is less restrictive than the Regulations in that it also admits health care supplied by private providers. Furthermore, in general, no prior authorisation is necessary to be

[1] This involves a minor loss of generality as SHI a Member State may be based on the cost reimbursement prin-ciple for some types of health care. E.g., in France, SHI patients will be reimbursed for outpatient care (Chevreul et al., 2015, p. 93).

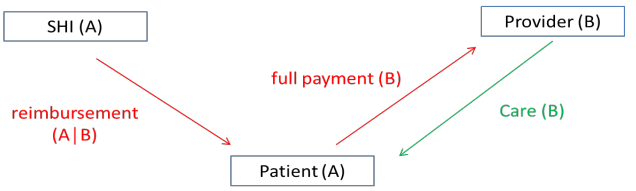

Fig. 2. Financing of cross-border health care — EU Directive

entitled to cross-border health care. This basic principle notwithstanding, a Member State may still introduce a system of prior authorisation. However, recognising that this impedes cross-border health care, the Directive imposes criteria which such a system must meet. First, prior authorisation must be confined to specific types of health care, most notably hospital care or care requiring the use of highly specialised medical equipment. Furthermore, prior authorisation should not be refused if the patient is entitled to that treatment but it cannot be provided at home within a time that is medically justifiable.

The financing arrangement is based upon cost reimbursement. That is, for a treatment received in Member State B, the patient from Member State A must pay upfront before turning to his SHI fund or the NHF at home for reimbursement. Furthermore, reimbursement by a SHI fund or the NHF will be up to the cost of that treatment at home, while not exceeding the actual cost to the patient. Fig. 2 exhibits the payments involved in the financing arrangement of the EU Directive. As the notation indicates, reimbursement of care obtained in Member State B is governed by the rules in Member State A.

It is possible that the requirements of both the Regulations and the Directive are satisfied. In particular, this refers to cases in which prior authorisation has been granted for a given treatment in another Member State. Then, the patient has a right to be informed about both pathways such that he/she may choose the one which to which pathway health care shall be financed (European Parliament and Council of the European Union, 2011).

A final remark on the Directive: The principle of non-discrimination implies that providers must not charge patients from another Member State in a manner that differs from charging domestic patients. However, as the analysis in the next section will show, this may still leave some scope with respect to the tariff that is to be applied. More specifically, this will be true whenever different tariffs exist such as, e.g., a tariff for SHI or NHF patients and another one for private patients.

As the baseline case for the evaluation of a financing arrangement, we will take the utilisation of health care by a domestic patient insured with either SHI or NHF. Essentially, our analysis relies on three criteria which are given by the pure financial incentive, the payment risk and the administrative burden. First, the pure financial incentive refers to the financial impact of a patient if the financing arrangement fully works as intended, i.e., neglecting any payment risk. E.g., a provider has a pure financial incentive to treat a cross-border patient if remuneration is higher than for a domestic patient who is similar to the patient from another Member State. However, the payment risk associated with financing cross-border health care also needs to be considered. Thus, the second criterion relates to the risk of payment delay or payment default, again in comparison with providing care to a domestic patient. Finally, a financial arrangement may impose an additional administrative burden. More specifically, this criterion relates to any administrative effort which must be undertaken to complete the financial transactions due to cross-border health care.

2. Impact analysis

In this section, we will analyse the financing arrangements associated with the two pathways to obtaining planned health care in another EU Member State. More specifically, our intention is to investigate the implications for providers, patients and SHI funds or the NHF. In each case, the benchmark is given by the corresponding transaction carried out on a purely national level. Essentially, a financing arrangement will be assessed with respect to the three criteria of pure financial incentive, financial risk and administrative burden.

2.1. Providers

Consider first the case of a patient who receives cross-border health care according to the Social Security Regulations. As mentioned in the previous section, a provider is obliged to apply the same tariff as for domestic SHI patients. More precisely, the provider is entitled to full remuneration according to

the tariff. At first sight, therefore, it seems that the pure financial incentive for a provider is no different from the incentive holding for the treatment of a similar domestic patient. Referring to Fig. 1, the copayment (B) will be the same but not necessarily the remuneration (B) by SHI. In fact, for domestic patients, remuneration in the Member State of treatment may fall short of the one scheduled by the tariff. Thus, to the extent that such deviations do occur, the pure financial incentive for treating a patient from another Member State will actually be stronger.

More specifically, this will be relevant whenever a tariff or a fee schedule is supplemented by further measures to contain costs. E.g., in Germany, a substantial part of the ambulatory care provided by physicians is subject to a budget such that, for the marginal patient, remuneration of services will be less than the negotiated fees (Busse & Blümel, 2014, pp. 149-153). Furthermore, in the case of hospital care, it is quite common to impose restrictions on revenue per case to account for the high share of fixed costs. For example, with a DRG scheme, a hospital will ultimately receive less than the full DRG payment for a domestic patient. E.g., in Germany, depending on the volume of patients treated, hospitals may have to pay back to SHI as much as 65% of their DRG revenue for the marginal patient (Busse & Blümel, 2014, p. 148). Likewise, in Italy, remuneration of the marginal patient will also typically be lower than the DRG payment (Ferré et al., 2014, p. 66). As these remarks show, the pure financial incentive for treating a patient from another Member State may be quite strong.

Turning to payment risks, there is no additional risk for that part of a provider's remuneration which is paid by a third party in the Member State of treatment because this follows exactly the same procedure as for a domestic patient. Thus, we only need to consider the copayment of the patient. Clearly, to the extent that this payment must be made before treatment, a provider faces no risk at all[2]. However, things are different if the patient must settle the copayment after receiving treatment. In this case, the risk of delay or even (partial) default may be higher than for a domestic patient because it can be more difficult to collect a payment from patients of another Member State.

Lastly, consider the administrative burden on providers associated with implementing the financing arrangement for a patient from another Member State. More specifically, this concerns any effort by the provider to obtain full remuneration. Hence, as with financial risk, this arises only in conjunction with a payment to be made by the patient. To cope with the higher financial risk, a higher administrative burden will arise for the treatment of a patient from another Member State, e.g., for issuing reminders. However, if health insurance in the Member State of treatment is provided by an NHF like the NHS, the administrative burden will be higher even if no payments are to be collected from patients. More specifically, since providers are supposed to identify overseas patients, dealing with such patients requires them to exert more administrative effort.

Consider now a patient from another Member State seeking treatment according to the Directive. With respect to the pure financial incentive, the principle of non-discrimination requires providers to apply the same tariff as for domestic patients. Thus, the incentive appears to be the same as for patients seeking cross-border health care on the Regulations. However, since the patient now is not entitled to be treated like a SHI patient in the Member State of treatment, a provider may be free to or even must apply another tariff, i.e., the tariff for patients either with private health insurance or who are paying directly. In other words, the full payment (B) in Fig. 2 may differ from the sum of remuneration (B) and copayment (B) in Fig. 1. E.g., in Germany, this is true for physicians in the ambulatory care but not for hospital care because, in the latter case, no separate private tariff exists. On the other hand, in the UK, patients from another Member State are to be charged the same fees as ordinary NHS patients unless they specifically ask to be treated as private patients (Department of Health, 2016, p. 82). Summing up, the pure financial incentive for providers likely will be stronger than for treating a similar domestic patient and may also exceed the incentive given by the Regulations.

Turning to payment risk, this now relates to the full remuneration of the provider which the patient must pay upfront. Again, if payment must be made before treatment, no such risk exists. Yet the common practice is to bill the patient after treatment. In this case, the payment due from the patient of another Member State will exceed the copayment of a similar domestic patient, possibly by a rather substantial amount. Thus, there are two reasons for an increase in payment risk: first, the risk relates to a higher pay-

[2] In fact, the NHS has been advised that "… elective treatment should not begin until full payment has been received" (Department of Health, 2016, p. 4).

ment by the patient and, second, it will be more difficult to recover payments from foreign patients[3].

As the example of the NHS shows, somewhat different results exist for an NHF. Applying the principle of non-discrimination, such patients are entitled to receive most health care for free. In particular, this is true for ambulatory care unless a patient explicitly wants to be treated like a private patient which implies that the corresponding fees will be charged (Department of Health, 2016). In fact, the only exception is hospital care since hospitals must charge the patient according to the NHS tariff. Recently, the following incentive scheme has been put into operation: after billing a patient from another Member State, a hospital receives 75% of the amount from the NHS. When the patient has settled the bill, his payment is split up in such a way that the hospital receives a further 25% with the remaining 75% going to the NHS, thereby just compensating the advance payment by the latter to the hospital[4]. Summing up, with respect to the payment risk, the above result for SHI based on benefits-in-kind must be modified in that the risk applies to hospitals only and, moreover, to just 25% of the remuneration.

As for the administrative burden, it is not difficult to see that patients seeking health care on the Directive will also impose a higher burden on providers. More precisely, this is true because the administrative effort is positively correlated with payment risk. In addition, in comparison with similar domestic patients, it is more difficult to obtain payments from patients from another Member State. Again, for the NHS an additional administrative burden arises for providers due to the requirement to identify overseas patients. Unlike the payment risk, this burden is not confined to hospitals.

2.2. Patients

In comparison with treatment at home, patients seeking cross-border health care on either pathway will usually have to bear an additional cost for travel and accommodation. If they are living in a cross-border region, this cost can be small or may not even exist. However, in other cases, it will be substantial and act as a financial disincentive. In what follows we shall not consider the cost of travel and accommodation because it is not part of a financial arrangement for cross-border health care[5].

Consider first a patient on the pathway of the Regulations. Clearly, from his point of view, the pure financial incentive depends on the copayment (B) as depicted in Fig. 1. More precisely, there is an incentive in favour of cross-border health care if, for a given treatment, this copayment is lower than the copayment in the Member State of affiliation. It follows that no such incentive exists if the latter copayment is nil. While this is straightforward, the size of the copayment may depend on which provider is chosen. E.g., for the ambulatory health care in France, there are two groups of physicians both under contract with SHI. Whereas providers in the first group must apply the state-regulated fees, the other providers are free to set higher fees (Chevreul et al., 2015, pp. 96-97). Thus, when a patient is treated by a physician belonging to the second group, the copayment will actually be higher. In sum, the pure financial incentive for cross-border health care may depend on the chosen provider, both at home and abroad[6].

Turning to payment risk, there appears to be no essential difference to receiving treatment at home because the payment procedures in both Member States are similar as far as the patient is concerned. However, as mentioned above, the size of the copayment may depend on which provider is chosen. Hence, if the patient is uncertain about whether his provider abroad will charge state-regulated fees or not while being clear about this at home, cross-border health care does introduce some payment risk. On the other hand, with respect to administrative burden, there is no difference since this is closely related to the payment procedure. Thus, when thinking about whether to seek cross-border health care on the Regulations, a patient will have to consider only the pure financial incentive and possibly the associated payment risk.

[3] E.g., recent data show that more than a third of German hospitals suffer from payment defaults relating to patients from other Member States, with an average loss of almost 3.000 Euro per case (Deutsches Krankenhausinstitut, 2015, pp. 26-29).

[4] The incentive effect of this scheme is bigger for other overseas patients because these are to be charged 50% above the NHS tariff (National Audit Office, 2016, pp. 44-45).

[5] In fact, the Directive leaves some scope for Member States to cover these costs as well (European Parliament and Council of the European Union, 2011). However, we have been unable to find evidence on this.

[6] As mentioned in section 2, SHI in the Member State of affiliation may cover part of the patient's copayment if treatment in the Member State involves a lower cost. Clearly, such a reduction would improve the financial incentive of the patient to seek cross-border health care. However, we have been unable to find empirical evidence on this.

On some contrast, the pure financial incentive set by the Directive depends on the cost of health care in the Member State of treatment. As shown in Fig. 2, after making the full payment (B) upfront, the patient will get reimbursed according to the tariff for SHI or NHF in the Member State of affiliation, with the provision that reimbursement (A|B) must not exceed his/her payment in the Member State B. On balance, receiving health care abroad leads to a copayment equal to the difference between full payment (B) and reimbursement (A|B). In comparison, health care at home would involve a copayment which is the result of netting out the cost of treatment, i.e., full payment (A), with reimbursement (A). Thus, conditional upon a positive copayment at home, treatment abroad will be financially attractive to the patient whenever full payment (B) is lower than full payment (A) (European Patients Forum, 2013, p. 9). On the other hand, there is no pure financial incentive for cross-border health care if health care at home involves no copayment.

It is not difficult to see that the transactions associated with cross-border health care on the Directive involve considerable financial risks for the patient. Due to a lack of information on the associated tariffs, the patient will typically know neither full payment (B) nor reimbursement (A). First, reimbursement at home will be uncertain because SHI or NHF is based on benefits-in-kind such that the patient will not be familiar with the underlying tariff. Second, since full payment (B) may depend on the chosen provider, it will even be more uncertain than reimbursement at home. Recognising the payment risks which these uncertainties impose on the patient, the Directive obliges Member States to set up National Contact Points (NCP) to provide patients with all the necessary information. However, as has been noted repeatedly, at present the information available from NCP is not sufficient to achieve this objective (European Patients Forum, 2015, pp. 9-10; European Commission, 2015a, pp. 12-13; European Commission, 2015b, pp. 8-10).

In addition, as regards reimbursement in the Member State of affiliation, there is strong empirical evidence of further payment risks. E.g., for health care not subject to prior authorisation under the Directive, a sizeable number of requests for reimbursement have been refused (European Commission, 2016, pp. 19-20). Next, considerable delays have been reported due to long processing times of requests for reimbursement (European Commission, 2016, p. 17 and p. 20; European Patients Forum, 2015, p. 9). In addition, there is also a risk that patients will obtain only partial reimbursement (Hartrampf, 2016, p. 12). Finally, some Member States appear to base reimbursement on tariffs which are lower than the going SHI or NHF tariff (European Patients Forum, 2016, p. 11; European Commission, 2015b, pp. 5-6). While this is contrary to the provisions of the Directive, SHI funds or an NHF in the Member State of affiliation thereby impose a further element of payment risk on the patient.

Turning to administrative burden, the patient clearly must exert some effort to complete the financial transaction associated with cross-border health care. At any rate, this includes the request for reimbursement of health care received in the Member State of treatment. Furthermore, in the absence of prior authorisation, the patient may have to produce a translation of the invoice obtained from the provider abroad. More specifically, in some cases, SHI funds or the NHF require a sworn translation (European Patients Forum, 2016, p. 11). Since no effort is necessary when receiving health care at home, seeking cross-border health care on the Directive clearly imposes an additional burden on the patient.

2.3. SHI or NHF

For a patient receiving cross-border health care according to the Regulations, we need to consider the impact on SHI or NHF in both Member States. First, for a SHI fund in the Member State of treatment, the pure financial incentive is strong because these funds, acting only as a financial intermediary, can claim full reimbursement. However, there is a payment risk as SHI or NHF in the Member State of affiliation may delay or even default on reimbursement (Hérault, 2012, p. 185). Finally, to request reimbursement, some administrative burden must be incurred. In contrast, no administrative effort arises for the remuneration of providers as the procedure will be the same as for similar domestic patients.

The case of an NHF can be somewhat different as the example of the NHS demonstrates. More specifically, this statement refers to both payment risk and administrative burden. As argued above, currently it is difficult for providers in the UK to identify overseas patients, a group which also includes patients from other Member States. In fact, in the absence of specific action by the NHS, they also lack the incentive to do so. In turn, it falls on the NHS to set appropriate incentives for providers. Clearly, this imposes an additional administrative burden on the NHS.

Moreover, while the payment risk associated with the charges on SHI funds or NHF in another Member State is no different from the one described above, another risk relates to the size of charges. Even though precise data for planned health care according to the Regulations are lacking, there is clear evidence that only a small part of the total cost is actually charged (House of Commons, 2017, pp. 4-5).

Turning to SHI or NHF in the Member State of affiliation, consider first the pure financial incentive. Referring to Fig. 1, as net remuneration (B) must be fully reimbursed, there will be a pure financial incentive whenever net remuneration (A), i.e., the cost of treatment at home to SHI or NHF, is higher. Hence, a low total cost of treatment in Member State B or a high copayment (B) by the patient, both in relation to the corresponding values for Member State A, will produce a financial incentive for cross-border health care. However, since these conditions are not necessarily fulfilled in practice, no general conclusion is available for the pure financial incentive.

Moving on, we can address the other two criteria very briefly. In fact, there is no payment risk as an SHI fund or the NHF simply must reimburse the cross-border treatment of an insured patient, conditional upon prior authorisation. Upon receiving the invoice from SHI or NHF in the Member State of treatment, it is only necessary to check whether this corresponds to what has been authorised. Thus, some — rather minor — administrative burden arises.

With the Directive, it suffices to consider SHI or NHF in the Member State of affiliation as these are the only third payers involved in the financial transaction due to cross-border health care. More specifically, as explained above, health care received abroad will be reimbursed according to the rules and tariffs at home, with full payment (B) by the patient as an upper bound. Thus, neglecting the boundary case in which full payment (B) is just equal to the cost of treatment at home to SHI or NHF, a pure financial incentive for cross-border health care will generally exist.

Upon receiving a request for reimbursement, an SHI fund or NHF in the Member State of affiliation must examine the invoice and other documents to determine the amount to be paid out to the patient. Thus, the associated workload will be higher than for a similar domestic patient due to, e.g., the necessity to review the medical documentation or to produce a sworn translation of an invoice, the latter pertaining to cases with prior authorisation (European Commission, 2015a, p. 13). As an implication of the higher administrative burden, some payment risk will also arise because the result of checking the documents produced by the patient may influence the amount reimbursed.

3. Discussion

In this section, the implications for providers, patients and SHI or NHF will be put together to obtain a comprehensive view of the financing arrangements. More specifically, we will look at the impact on cross-border health care induced by these arrangements. In addition, the feedback effects on national health policy will also be addressed briefly.

Turning to the financial arrangement of the Regulations, let us first look at the financial incentives of providers and patients. As demonstrated above, the incentive for providers to treat patients from another Member State is at least as strong as for a similar domestic patient. On the other hand, patients will have an incentive to seek treatment in another Member State if the copayment is lower than at home. Thus, the direction of cross-border health care induced by the financing arrangement will depend on the financial generosity of the publicly funded health care systems in other Member States in comparison with the health care system at home. In particular, if some treatment is included in the benefit basket of SHI or NHF in another Member State but not at home, there is a strong financial incentive for patients to go abroad.

From the viewpoint of trade theory, cross-border health care enhances welfare if patients either obtain the same treatment at a lower cost or a better treatment at an additional cost that is considered to be worth paying. However, it is not difficult to see that the focus on copayments induced by the Regulations may produce quite different patient flows because the financial generosity of the national health care system may provide the wrong signal to the patient with respect to the cost of care. Thus, the overall impact upon welfare of the Regulations is by no means clear.

Moreover, the financial incentive of SHI or NHF at home need not be fully aligned with the interests of patients and providers. Clearly, for health care not included in the benefit basket at home, there is no such incentive. Even though the financial implications will be less serious, a similar observation holds for health care which is available abroad at a lower copayment but imposes a higher cost to SHI or NHF.

In all other cases, the pure financial incentives of the three actors involved will coincide.

It is important to observe that, whenever the financial incentive of SHI or NHF conflicts with the incentives of providers and patients, the financial arrangement associated with the Regulations may severely threaten the viability of the publicly funded health care system in a Member State. To see this, suppose that cross-border health care was to occur on a substantial scale in such cases. Then, patients going abroad to receive treatment would increase the cost to SHI or NHF at home, with a particularly strong impact on expenditure due to health care not included in the benefit basket. In turn, this imposes a constraint upon cost containment policy in the Member State of affiliation. More specifically, limiting the benefit basket or imposing high copayments might not be feasible because cross-border health care would provide patients with an opportunity to circumvent these features of national health policy.

Up to now, we have focused on the financial incentive, thus neglecting the other two criteria which also belong to a financial arrangement. However, apart from a few special cases, both the payment risk and administrative burden will be negligible for this particular pathway to cross-border health care. Hence, under the Regulations, the overall impact of the associated financial arrangement is governed almost entirely by the financial incentive. Nevertheless, to obtain a complete picture, it is necessary to consider further aspects. First, and foremost, patients need prior authorisation before going abroad for medical treatment. In fact, as mentioned above, SHI or NHF in a Member State may well refuse prior authorisation in cases in which the financial arrangement would impose a threat upon national health policy[7]. More specifically, the only exception concerns health care that belongs to the benefit basket at home but cannot be made available in due time to a patient. However, in such cases, the impact upon expenditure of SHI or NHF will be rather moderate. Finally, another aspect relates to the cost of travel and accommodation associated with cross-border health care. Unlike prior authorisation, this acts to dampen the incentive to go abroad in any case.

Even though prior authorisation as a means to control cross-border health care on the pathway given by the Regulations is certainly important, the impact of the financial arrangement should not be underestimated. On the one hand, the incentives provided by this arrangement influence both how often and for which types of care patients will apply for prior authorisation. On the other hand, to circumvent this restriction, patients may attempt to pretend unplanned health care. This represents another pathway to cross-border health care according to the Regulations which is, for obvious reasons, not subject to prior authorisation (Busse et al., 2011, p. 78; Footman et al., 2014, p. 10).

Consider now the financial arrangement provided by the Directive. Again, it is helpful to begin with the financial incentives of the main actors. Clearly, providers have an incentive to treat patients from another Member State because their remuneration will be at least as high as under the Regulations. As argued in the previous section, conditional upon a positive copayment for health care at home, the incentive of patients is to consider the full cost of treatment abroad. More specifically, if the latter is lower than at home, cross-border health care offers the opportunity to save some or even all the copayment at home. On the other hand, if health care abroad is more expensive, the patient will be reluctant to bear the additional cost unless the health benefit offered by the treatment is evaluated to be worth it.

In addition, the financial incentive of SHI or NHF in the Member State of affiliation has been shown to fully coincide with the incentives of both providers and patients[8]. Thus, confining attention to the pure financial incentive of the actors involved, the impact of the Directive is to engender patient flows among Member States such that overall welfare will be enhanced. However, due to the application of a different tariff, health care may be more expensive when provided to patients from another Member State. Then, the incentives for cross-border health care will be weakened somewhat and, by implication, this acts to reduce the associated welfare gains.

These positive effects notwithstanding, cross-border health care according to the Directive also involves serious threats to national health policy. First, it may weaken or even nullify policies designed to contain the cost of health care. More specifically, consider a policy which imposes a restriction upon the volume of care provided by setting marginal remuneration below average remuneration. While this is quite common for hospital care to account for the large share of fixed costs, it may also apply to

[7] In particular, this is true for health care not included in the benefit basket of publicly funded health insurance in the Member State of affiliation.

[8] Note that this statement refers only to providers directly involved in cross-border health care, i.e., to providers in the Member State of treatment.

outpatient care[9]. Clearly, if patients go abroad to receive treatment, restrictions upon the volume of care at home will be weakened or even become ineffective. Moreover, given that reimbursement in the Member State of affiliation will be based on average remuneration, the incentive to obtain health care in another Member State turns out to be too strong. Second, cross-border health care on the Directive also gives rise to an equity problem. More precisely, only patients who are able to pay upfront will have access to treatment abroad[10]. Given that treatment can easily involve a substantial cost which only few people can afford to pay, the Directive involves a lack of equity of access to cross-border health care.

Apart from the financial incentives, the financing arrangement of the Directive must also be evaluated with respect to the two other criteria. As demonstrated in the previous section, this pathway to cross-border health care involves substantial payment risks and a rather high administrative burden for both patients and providers. Since these act as a disincentive, their impact is to diminish patient flows within the European Union. Building on the line of reasoning exposed above, this has two effects: while the gains from cross-border health care will be lower, the threats to national health care policy turn out to be less serious as well. Presumably, with this ambiguity in mind, the European Parliament and the Council of the EU stated that the Directive "should not result in patients being encouraged to receive treatment outside their Member State of affiliation" (European Parliament…, 2011).

Finally, there are further aspects to consider to obtain a complete picture. First, Member States may also introduce a system of prior authorisation under the Directive. However, as mentioned above, this must be confined to special types of health care. Currently, while several Member States have not introduced prior authorisation at all, other Member States rely on it as a means to control cross-border health care according to the Directive (European Commission, 2015b, pp. 4-5). To the extent that prior authorisation relates to health care subject to national policies, it also provides an instrument to preserve, e.g., a policy designed to contain the cost of care.

[9] E.g., in Germany, this is also true for the remuneration of ambulatory care physicians by SHI.

[10] Even though Member States are free to introduce a system of direct payments which would solve this problem, we have been unable to find evidence on this. Thus, it seems safe to assume that patients will have to pay upfront even for hospital care.

Conclusions

In the present paper, we analyse the impact of the financing arrangements associated with the pathways to cross-border health care within the European Union. More specifically, while our prime objective is to investigate the effects upon the direction of cross-border health care, we also address feedback effects on welfare and national health policy. With a focus on planned health care, our analysis covers the main actors, i.e., providers, patients, and Statutory Health Insurance (SHI) funds or a National Health Fund (NHF). Apart from the financial incentive, a financing arrangement is taken to include payment risks and administrative burden. By adopting a broad perspective, both with respect to actors and financing, a comprehensive analysis of the pathways provided by the Social Security Regulations (Regulation 883/2004) and the EU Directive 2011/24/EU can be undertaken.

For the financing arrangement of the Regulations, providers will always have a financial incentive to provide care to patients from another Member State. In contrast, the incentive of patients critically hinges upon the copayment abroad which must be lower than the copayment at home. Since, apart from a few special cases, both the payment risk and administrative burden are rather small, the incentive of patients turns out to be crucial for the direction of cross-border health care induced by the financing arrangement. However, given that the incentive of SHI funds or the NHF rather depends on the cost of health care to be borne by them, the interests of third party payers may well run counter to the interests of patients. If such a conflict exists, cross-border health care will increase health care expenditure by SHI or NHF, and may also reduce the overall welfare. In particular, it will threaten the national health policy by setting an incentive for patients to go abroad to obtain funding for health care not included in the benefit basket of SHI or NHF at home.

For the financing arrangement of the Directive, we obtain different results. Again, providers will have a financial incentive to provide health care to patients from another Member State. However, conditional upon a positive copayment at home, patients will now want to go abroad if this involves a lower total cost. Thus, the financial interests of patients and third party payers do coincide in such a way that cross-border health care will dampen expenditure by SHI or NHF and enhance welfare. Nevertheless, there are

several reasons to qualify this result. First, the pathway associated with the Directive imposes a considerable cost in terms of payment risk and administrative burden upon both patients and providers. Next, for cost containment policies involving a remuneration of providers such that the marginal payment is lower than the average payment, the financing arrangement can be shown to provide an incentive that is too strong while also undermining national health policy. Finally, due to the requirement to pay upfront for health care in another Member State, the pathway of the Directive also fails to ensure equity of access to cross-border health care.

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ISMSME International Society for Manufacturing, Service and Management Engineering

received: 15 November 2016
accepted: 25 May 2017

pages: 21-31

The issues of healthcare-associated infections — the economic and social perspective

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ABSTRACT

The aim of the paper was to diagnose and analyse the rates of infections in Polish voivodships, and possible consequences from both economic and social perspectives of the changes in the levels of cases reported. For the analyses, data banks of Central Statistical Office in Warsaw were used, in particular, information on the incidence of infectious diseases and poisonings. The rates of changes and spatial concentration of the phenomena were investigated in the period between 2005 and 2015. For estimates of regional trends, the Shift-Share Analysis was adopted, and the pattern of spatial distribution was defined on the basis of location quotients. Extreme values of location quotients were observed in Warmińsko-Mazurskie for shigellosis, in Lubuskie for trichinellosis, and for AIDS in Dolnośląskie. Location quotient values allowed identifying regions with a higher spatial concentration of infectious diseases incidences, which in turn could indicate areas and cases where preventive actions should be improved or modified. The Shift-Share Analysis resulted in pointing out regions that recorded a positive change in infection rates. The obtained results also demonstrated that in some cases, the impact of structural changes influences the net rates of infections more than the local components. The obtained results directly indicated objects (regions) where attention should be paid to prevention. Especially, the results of spatial distribution and concentration allowed a reliable analysis of the state of population incidence rates, as well as answered questions concerning the origin of rates whether the change derived from structural, local or overall tendencies. Results could be adopted, for instance, in preventive strategies of local governments. The estimates might be beneficial from the perspective of the healthcare system, due to easier predictive scenarios of future infection and possible centres with the increase in incidence.

KEY WORDS

healthcare-associated infections, regional comparisons, incidences of infectious, Shift-Share Analysis

DOI: 10.1515/emj-2017-0010

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Introduction

The healthcare sector is one of the key components of any economy. During every parliament election, slogans can be heard about the necessary or planned changes that a political formation is prepared to introduce immediately. Patients regularly experience failed attempts to effectively meet their needs for medical services, not to mention the quality improvement. However, some of the changes, such as the introduction of the system for electronic verification of the eligibility to health benefits, are quite visible and have a positive connotation. With growing importance of IT technologies in the healthcare system, the large quantity of collected data creates further opportunities to differently define the use of

quantitative methods that were previously reserved for economic evaluation.

The main objective of this paper is to analyse the spatial differentiation of healthcare-associated infection rates including their types and geographical diversification. The empirical research concentrated on the use of the methods of spatial statistics and econometrics: the method of shifts in both static and dynamic and spatial concentration. Due to the availability and comparability of data, the statistical analyses were performed for the years 2005-2015. The source of the data was the Central Statistical Office in Warsaw.

1. Literature review

In 2002, four countries adopted legislation that required public health care organisations to disclose rates of healthcare-associated infections (HAI). Today, similar reports are being conducted in several other countries. Proponents of mandatory public reporting of HAI believe that disclosure of such information would improve the overall quality of health care by reducing HAI and give consumers the possibility to make more informed choices about their health (McKibben et al., 2005, pp. 217-226).

Infection control and programmes dedicated to infection control are well organised and characterised by their complexity. However, a lot of scientific papers refer to nosocomial infections and their spread. In addition, it might be noted that most of the articles devoted to infections present relationship between the implementation of recommendations in this field and their application (for instance, conducting microbiological tests or washing hands). Another frequently encountered analysis is a comparison between infection occurrences on the international scale or between Poland and Europe.

Under the section of HAI, the Centres for Disease Control and Prevention (CDC) provides definitions and characteristics of most bacteria, viruses and pathogenic fungi causing infections (CDC, 2016). However, this description does not include analyses of the infections in the Data and Statistics module, which would undoubtedly respond to the needs of the infection analysis in terms of the decomposition, change or tendencies. In the paper International study of the prevalence and outcomes of infection in intensive care units (Vincent et al., 2009, pp. 2323-2329), the authors focused on the global epidemiology of infections, mostly in several world's intensive care units (ICU).

In developing countries, healthcare-associated infections account for 10% of cases, and in the developed countries, they amount to 7% of patients under the medical and, mostly, hospital care. However, these infections must be controlled using antibacterial agents and immunity in combination with special antibiotic policy and infection control programmes (Cianciara, 2010).

An effective monitoring system could have an important impact on the international and national level. Efforts are demanded from all relevant actors within the control and prevention of infections (Khan, 2017). What's more, according to a study conducted under the supervision of the World Health Organization (WHO), in 2010, the average frequency of infections, including nosocomial infections represented within the countries of the Baltic Sea, amounted to 11.8% and in Europe 7.7% of total infections. In the Western Pacific Region, data on average indicated 9% of cases and 10% in Asia. However, due to disorganisation and the lack of convergence in the registration of infections, the two last-mentioned areas may be underestimated (Cianciara, 2010). This could easily indicate problems in determining the extent of hazards in this field, designing the appropriate strategies, and consequently mapping as well as introducing them by local governments. The comparison of the organisation and control of nosocomial infections in Poland and European countries can be found in the work Organisation and infection control in Polish hospitals. The results of PROHIBIT programme (Różańska, 2014, pp. 117-120).

The Authors believe that insufficient materials are available for analysis, such as specific quantitative analyses, or guidelines, or even full and comprehensive databases devoted to various issues related to infections, especially the time-cross-sectional distribution (for instance, for Polish NUTS-2 spatial units). Furthermore, the socio-economical frame for infections rates in voivodship makes this problem important from the perspective of the Authors as well as the society, which served as the basis for the Authors to undertake the research.

Despite the rapid development of knowledge and diagnostic techniques, the degree of exposure to infections has not decreased. The frequency of infection rates may indicate the safety and quality of the healthcare system. Hence, the emphasis is placed on the impact on residents' education, as well as the

medical community to benefit from this knowledge (Denys, 2013, pp. 17-18).

Infections (in the broad sense) have become an important issue for the healthcare system in Poland. They can be divided using many different approaches that generally depend on the multidisciplinarity of the perspective. The Act of 5 December 2008 on Preventing and fighting infections and infectious diseases affecting humans, introduced an obligation to respond, register and supervise infected people as well as implement prevention and control of nosocomial infections (Ustawa z dnia 5 grudnia 2008 r. o zapobieganiu…, 2008; Dziewa, 2012, pp. 56-63).

In the literature, many definitions of an infection can be found. In each definition, common explanations are identified in accordance to which an infection is 'an unplanned infiltration of infection into the body', which can also be further elaborated by the explanation stating that it is a 'penetration into the body and multiplication of the pathogenic microorganisms that can cause disease'. For a disease to be induced, the resistance of the body must be overcome. If symptoms of an infection are located in the vicinity of an infection, the condition could be described as a local infection. When the infection is accompanied by symptoms of an Inflammatory Response, this situation is called sepsis (Mała Encyklopedia PWN, 1995, p. 989). There are many classifications of infections, for instance, infections can be divided into:

- primary and secondary infections,
- local and generalised infection (sepsis),
- infection subclinical (asymptomatic), i.e. running infection without symptoms of a disease,
- infection abortifacient, i.e. having a mild and short course,
- superinfection — a re-infection with the same pathogen in the course of treatment or convalescence,
- reinfection — a re-infection with the same pathogen after recovery,
- food infection — an infection caused by pathogenic microorganisms present in food and water that entered through the digestive system,
- nosocomial infection — any infection associated with a hospital stay,
- endogenous infection — infection caused by the resident flora,
- mixed infection, caused by several different pathogens at the same time,
- droplet infection — an infection caused by pathogenic microorganisms that are found in inhaled air (Podręczny…, 1996, p. 781).

Furthermore, in the lexicon of medicine, a contagion is also defined as an infection. Depending on the virulence of pathogenic and the number of infectious agents, the reactivity of microorganisms and the place of penetration develops a contagious disease or a "silent infection", or results in a harmless infection which indicates a symbiotic coexistence with a physiological microbial flora, for example physiological microbial flora (Podręczny…, 1996, p. 781).

Infection can occur through several ways, such as air-pollen, ingestion (oral), direct and indirect contact, and by tearing of tissues. It needs to be highlighted that the risk of infection factors (nosocomial, for example) depends on the health condition of a patient, including:

- age, malnutrition, immunological deficiency,
- general disease, such as multi-organ injuries, diabetes, congenital and acquired immunodeficiency syndromes,
- comorbidity, such as chronic renal failure, the use of medications without indications, bedsores, long-term use of antibiotics, children staying at home, alcoholism, cirrhosis, organ transplantation (Profilaktyka…, 2016).

The research on the management of healthcare services, including the quality of research, must be carried out in accordance with the general principles of quality of health care. This means that various elements, such as technical, management, information, economic, administrative, medical and marketing fields, must operate together (Opolski et al., 2003, p. 29).

The quality of healthcare consists of many dimensions that can be assessed such as effectiveness (based on current scientific findings) and efficiency (use of economic analysis of different treatments), availability of services, safety, adaptation of services to existing needs of patients and ensuring equal access to services for all patients (Czerw et al., 2012, pp. 269-273).

1.1. Economic and social costs of infections

Infection surveillance is one of the priorities of healthcare in many countries around the world. This is an important element for the organisation of health care for patients and payers, health care management entities, doctors, economists and lawyers (Wójkowska-Mach, 2009, p. 87). A common phenomenon in healthcare is an excess of the demand for health services compared to the available health

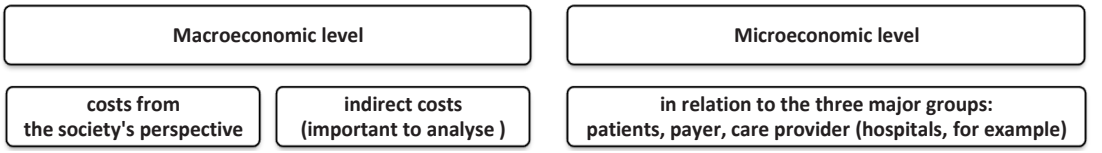

Fig. 1. Classification of costs levels

Source: authors' elaboration based on (Różańska, 2009b, p. 81).

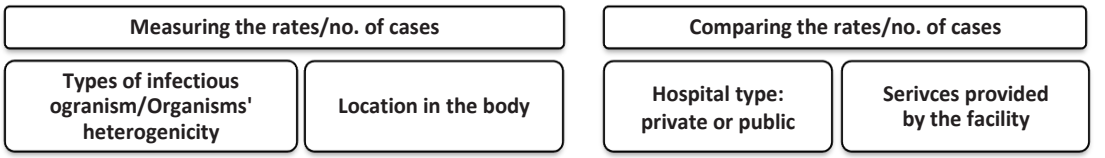

Fig. 2. Measurement and comparison of rates

Source: authors' elaboration based on (Khan et al., 2015, p. 512).

resources. The ideal situation occurs when health programmes, as well as a new medicine, is analysed not only for the effectiveness and efficiency of medical care but also in terms of economic viability. Depending on the needs, costs of infections also involve the assessment of intervention and prevention and should be analysed essentially on two levels: macro (the economy) and individual (Różańska, 2009a, p. 80).

Cost analysis can be conducted from various perspectives depending on the needs and the purpose of an analysis. The economic analysis in healthcare introduces mainly two types of costs: direct and indirect. At the macroeconomic level, the society is to incur all the costs associated with infections, including indirect costs resulting from, for instance, a delay in the return of patients to daily activities in a certain profession, and also direct costs associated with the patients' treatment. The indirect costs may consist of:

- higher costs as various types of social benefits,
- lower budget income resulting from the drop in productivity,
- premature deaths,
- opportunity costs of investing limited resources in treatment of cases with complications.

Direct costs are more tangible and easily measured. They cannot be missed regardless of the perspective of the scale. Direct costs (for the previously mentioned nosocomial infection) may consist of infection-related extension of hospitalisation, cost of staying at a hotel for the family and significant others, costs of antibiotics, additional therapeutic and diagnostic procedures, and labour costs of health professionals (Różańska, 2016, pp. 535-537).

When speaking on infections, the most important issue is measuring the rates of occurrences, while this strictly results from healthcare settings (Khan et al., 2015, p. 512). Due to the heterogeneity of infections, a situation may occur that infection rates show similarities, but in fact, cases differ from each other by the location of the disease. Not only the knowledge on the type of infection and its location is essential: it comes as no surprise that preventive methods, the level of safety precautions and infection management differ depending on whether the health care facility is public or private. The complexity of the issue results in measuring the cases (Fig. 2), leading to the shortage of appropriate, comparable data.

As an example of the complicity in the data collection on issues associated with healthcare infections, the literature and reports repeatedly describe few examples of characteristic (the MRSA: reports on rates of cases can be found in the European Centre for Disease Prevention and Control).

The summary indicators place Poland in the 2nd group ranging between 5–20% of hospital-associated infections that were classified as resistant. It is also easy to identify the tendency that the rate level increases depending on the environmental conditions, for instance, more cases of resistant infections were reported under conditions conducive to disease development (Cyprus or Spain) than under unfavourable locations (Finland, or Sweden). This increases the importance of the location factor.

Tab. 1. Methicillin-Resistant Staphylococcus Aureus (MRSA) % of hospital-acquired infections being resistant in 2012–2015

MRSA % of hospital-acquired infections being resistant Types of technology		
GROUP 1 > 20%	**GROUP 2 5 – 20%**	**GROUP 3 < 5%**
Croatia, Cyprus, Greece, Hungary, Italy, Malta, Portugal, Romania, Slovakia, Spain	Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Ireland, Latvia, Lithuania, Luxembourg, Poland, Slovenia, Switzerland, UK	Denmark, Estonia, Finland, Iceland, Netherlands, Norway, Sweden

Source: author's elaboration based on (ECDC EARS-net database, 12.12.2016).

2. Research methods

Nowadays, quantitative methods are perceived as a necessity in the analysis of the socioeconomics. The need to analyse is particular to the health sector. Quantitative techniques are more frequently incorporated into healthcare analyses to help make difficult decisions, for instance, regarding the financing of one health programme at the expense of others. Any decisions made from the societal point of view should be supported with appropriate tools, measures and techniques.

Few elaborations on the use of the Shift-Share Analysis (*SSA*) in healthcare are available, while in general, the *SSA* was used in the description of economic changes. However, the technique, previously reserved by statistics and econometrics, is successfully adopted in healthcare analyses. This tendency can be illustrated by an increasing number of publications and articles in the domestic and foreign literature as well. Hoppes (1997, pp. 35-45) sets an example on incorporating *SSA* for the analysis of healthcare death rates by disease. In terms of the domestic research, one should indicate numerous applications of the Shift-Share modelling, spatial distribution and concentration analysis, and spatial dependency testing. A similar pattern to the Hoppes's research but realised on a larger scale and from a different perspective (with some spatial modifications) could be seen in the study by Jewczak and Żółtaszek (2011, pp. 87-100), where authors focused on health-related causes of death and conducted the analysis for multiple objects and causes of deaths. Rozpędowska-Matraszek (2009, pp. 87-100) incorporated the Shift-Share modelling in healthcare analysis to investigate the employment restructuring changes, whereas Jewczak and Suchecka (2014, pp. 30-38) investigated the changes in the financing of healthcare systems of European countries.

The mentioned examples indicated that the techniques became widely used due to the multidimensional data on the healthcare system: temporal-sectoral (or sectional)-spatial dimensions, at the same time allowed conducting multi-faceted analyses, needed for health managers.

2.1. Spatial distribution

The research on spatial concentration and inequality in economy results presents a combination of two major classical trends: on the one hand, the study on the income inequality and poverty (Sen, 1973) and on the other, the analysis of the industry concentration (Hannah & Kay, 1977). The theoretical and practical interest in studying the spatial concentration derived additionally from the theory of New Geographical Economy, New Trade and Neoclassical Theories.

For the purposes of spatial distribution analysis as a basic method, location quotients (*LQ*) are often used. Due to the easiness of calculation and interpretation, *LQ*s allow identifying regions, areas or places that indicate a higher spatial concentration or even regional specialisation. The *LQ* indices compare the regional distribution of values of the selected variables with the distribution of the variable at the national level; it can be calculated as follows:

$$LQ_r^i = \frac{x_{ri} / x_r}{z_i / z} \tag{1}$$

where: x_{ri} — variable values for the *r*-th region and the *i*-th section, x_r — variable values for the r-th region, z_i — variable values for the *i*-th section, z — the total variables value.

If the *LQ* measure equals unity (*LQ*=1±0.15) than the distribution of the variable located in the region is similar as in the referential object, i.e. the national level. Respectively, on excessed or deficient levels of the spatial concentration of variable values, one can judge when *LQ* amount to much higher or lower ratios, differing from the uniform distribution.

2.2. Rates of changes — the analysis of growth

The Shift Share Analysis was firstly proposed in the late 1950s as a method for studying the diversity of the regional growth (Nazar & Hewings, 2004, pp. 476-490). It allows for the decomposition of changes which have occurred in values of considered variables on components, such as:

- local (connected with the geographic location of the region, its competitiveness or inner diversity),
- ross-sectoral (connected with structural diversity),
- global (connected with the improvement at the national level).

The values of the examined variables are weighted according to their share in the referential variable (reference category) in accordance with a pair of selected time points. The Shift Share model in the basic form can be defined, as follows (Suchecki, 2010, pp. 163-165):

$$tx_{r\bullet} - tx_{\bullet\bullet} = \sum_i u_{r\bullet(i)} \left(tx_{\bullet i} - tx_{\bullet\bullet} \right) + \sum_i u_{r\bullet(i)} \left(tx_{ri} - tx_{\bullet i} \right) \quad (2)$$

where: x_{ri} — variable values for the r-th region and the i-th section in the initial period, x^*_{ri} — variable values for the r-th region and the i-th section in the final period, z_{ri} — referential variable values for the r-th region and the i-th section in the initial period, z^*_{ri} — referential variable values for the r-th region and the i-th section in the final period of analysis, $u_{r\bullet(i)}$ — weights/regional shares defined as:

$$u_{r\bullet(i)} = \frac{z_{ri}}{\sum_i z_{ri}} \quad (3)$$

tx_{ri} — the regional change rate for the r-th region and the i-th section, defined as:

$$tx_{ri} = \frac{x^*_{ri} - x_{ri}}{x_{ri}} \quad (4)$$

$tx_{r\bullet}$ — the average change rate for the r-th region, defined as:

$$tx_{r\bullet} = \sum_i u_{r(i)} \cdot tx_{ri} \quad (5)$$

$tx_{\bullet i}$ — the average change rate for the i-th section, defined as:

$$tx_{\bullet i} = \sum_r \frac{z_{ri}}{\sum_r z_{ri}} \cdot tx_{ri} \quad (6)$$

$tx_{\bullet\bullet}$ — the average global change rate, defined as:

$$tx_{\bullet\bullet} = \sum_i \sum_r \frac{z_{ri}}{\sum_i \sum_r z_{ri}} \cdot tx_{ri} \quad (7)$$

Often, in practical applications, a simplified version of the model is adopted. In this version, the *SSA* can be defined as follows:

$$c_r = s_r + g_r \quad (8)$$

where:

$$c_r = tx_{r\bullet} - tx_{\bullet\bullet} \quad (9)$$

indicates the *net* effect value,

$$s_r = \sum_i u_{r\bullet(i)} \left(tx_{\bullet i} - tx_{\bullet\bullet} \right) \quad (10)$$

states for the structural component effect and

$$g_r = \sum_i u_{r\bullet(i)} \left(tx_{ri} - tx_{\bullet i} \right) \quad (11)$$

presents the local component effect.

In the initial assumption, the classical *SSA* approach method uses a fixed weight, and, therefore, does not take into account the possible changes in the reference variable. If analysed points are not too remote in time, the adoption of fixed weights does not generate significant errors. However, if the variables are tested over several years, the assumption of fixed weights appears to be unjustified, and it indicates analysing the consecutive periods in a stringwise manner. Numerous modifications to solve this and other problems of SSA methods have been made that could be summarised schematically using the Fig. 3.

In 1988, Barff and Knight (1998) corrected the classical *SSA* with a dynamic approach, in which for each pair of consecutive periods of time, to update the weights, the *SSA* model is determined and the corresponding effects are further summed up as follows:

$$\sum_t c_{rt} = \sum_t s_{rt} + \sum_t g_{rt} \quad (12)$$

where: t — indicates a period.

Subsequent modifications were made in 2004 by Nazar and Hewings (2004, pp. 476-490), who proposed introducing spatial weights matrix W (Suchecki, 2010, pp. 105-107, 194-198) into the classical SSA model to consider the spatial interactions (dynamic spatial *SSA* is also possible).

Both the spatial distribution (concentration) and the Shift Share Analysis require data summarised in a contingency table. For this reason, the analyses are conducted simultaneously and in some sense results, although *LQ*s and *SSA* indicate different phenomena, could be interpreted in a complementary manner.

3. Research results

The contingency table consisted of data on incidences of infectious diseases and poisonings in years 2005–2015. The Local Data Bank (LDB) of the Central Statistical Office (CSO) in Warsaw was the source of data. To evaluate the spatial units, the NUTS-2 division was adopted (split into voivodships).

where the first line represents the level for 2005 and the second one for 2015. The intensity of the phenomena apart from the quotient value was illustrated by the background pattern. The spatial diversification analysis allowed identifying the outstanding levels of concentration for trichinellosis in Lubuskie, shigellosis in Warmińsko-Mazurskie, and AIDS in Dolnośląskie. From the results of the analysis, the overall tendencies outline that the level of concentration decreases with time. Of course, from the viewpoint of the society, the lack of incidences or low values of *LQ* indicate the absence of infections, which is a positive development.

The desired changes in tendencies also confirmed the results of the *SSA* (Tab. 3).

As it could be observed, the national (referential) growth rate amounted to -27.29% for static and

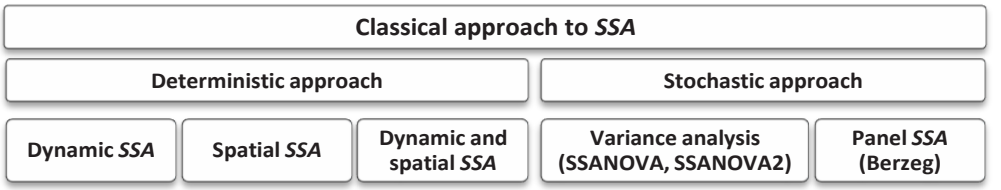

Fig. 3. Classification of Shift-Share Analysis methods

Source: authors' elaboration based on (Żółtaszek & Jewczak, 2011, p. 145).

While comparing the regional/spatial distribution, only the initial and final time periods were used (the 2005 and 2015); however, the *SSA* presented in the paper was conducted in static and dynamic schemes and the results were further compared to indicate the differences in estimates of the approaches.

It should be emphasised that statistical data presented in the LDB of the CSO, despite merging different classifications of infections, allowed for data aggregation to a contingency table; in the final database, the following list of infections was used: tetanus, whooping cough, measles, viral hepatitis type B, C and A, rubella, AIDS, salmonella, shigellosis, other bacterial food intoxications, acute diarrhoea in children under 2 years, scarlet fever, bacterial meningitis and/or encephalitis, viral meningitis, viral encephalitis, mumps, trichinellosis.

Results presented in Tab. 2 summarise the spatial diversification comparison and its change over time. The columns represent regions with the abbreviations given below. For each infection type and voivodship, LQ values were calculated in the manner of pairs,

-14.72% for a dynamic approach. In both cases, estimates confirmed a decrease in the number of incidences of infectious diseases reported on the national level. The regions that recorded a positive change in rates of infections showed a "negative" level of the net effect. The obtained results also demonstrated that the impact of structural changes in some cases (in Podkarpackie, for example) was stronger than local factors; however, the regional changes were mostly affected by the local component. In Dolnośląskie, the increase in the number of infections was the result of changes in the structural distribution due to the positive (decreasing) influence of local activities. It is worth mentioning that the rank of Świętokrzyskie Voivodship, where the highest limitations in the number of infections were estimated as rates indicated (especially for the dynamic *SSA*), this desirable situation was a consequence of the complexed lowering of several infections.

On the other hand, it cannot be overlooked that some regions noted a rapid increase in the rates of infections, for instance: Lubuskie, Pomorskie and

Tab. 2. Estimates of the concentration — values of location quotients *LQ*

Infections	Voivodships															
	DL	KP	LUL	LUS	LO	MP	MZ	OP	PK	PD	PM	SL	SW	WM	WP	ZP
Tetanus	1.50		0.98			4.18	0.58	2.65	3.56		1.46	2.13				
	1.52			3.28	1.42	4.16	0.50	3.61			1.74					1.86
Whooling cough	0.34	0.97	0.28	0.78	3.83	0.49	1.71	1.59	0.32	3.53	1.13	0.62	0.38	0.38	0.53	0.32
	0.55	1.40	0.54	0.54	2.32	0.97	1.36	0.54	0.48	1.55	0.66	0.94	0.31	0.32	1.82	0.60
Measles					1.29	3.48	0.59		2.55		1.69	3.69				
	1.52	0.33				2.30	0.99	0.93	0.56	0.70	0.25	0.35			1.58	5.12
Viral hepatits type B	2.83	0.80	0.89	2.13	1.82	0.74	0.86	1.13	0.69	0.75	1.67	0.99	0.96	0.46	0.67	0.76
	1.37	1.45	0.49	0.74	1.51	0.28	0.41	0.99	0.57	1.13	1.51	1.57	0.55	1.32	1.28	1.23
Viral hepatits type C	2.72	0.84	1.13	3.52	1.51	0.42	0.99	0.40	0.63	0.37	2.23	0.86	1.99	0.42	0.63	0.82
	1.79	1.68	1.24	1.65	1.46	0.43	0.58	0.89	0.72	0.88	0.55	1.14	1.22	1.39	1.26	1.12
Viral hepatits type A	0.83	0.44	2.99		0.92	1.67	0.85	2.94		2.18	1.22	0.75	0.32		0.42	2.69
	0.37	0.63	1.20		2.78	2.45	0.97	0.88	2.18	0.68	0.25	1.20			0.44	
Rubella	2.83	1.37	0.42	1.68	0.94	0.81	1.38	0.80	1.30	0.95	0.90	1.56	0.70	0.74	0.72	0.93
	1.22	1.86	0.94	1.88	0.49	0.85	0.97	1.27	1.57	0.88	0.57	0.96	0.95	1.18	1.26	1.60
AIDS	8.56	0.55	0.74	1.34	1.20	0.65	0.38	0.57		0.85	1.58	0.86	0.12	1.62	0.33	0.29
	3.73	0.38	0.61	0.32	1.81	0.33	0.45	1.42	0.22	2.19	1.83	0.97		2.52	0.76	1.65
Salmonella	1.22	0.95	1.38	2.73	0.92	1.69	1.12	0.74	1.85	1.38	1.63	0.63	0.54	0.85	0.54	1.48
	0.94	0.82	1.54	0.62	1.35	1.15	0.96	0.95	1.92	1.17	0.78	0.73	1.13	1.40	0.93	0.70
Shigellosis		0.14	1.13			0.75	0.29	1.49	1.34		1.93	0.30		11.85		3.99
		1.80			0.95	5.00	0.33				0.67	1.40		1.91		
Other bacterial food introxications	2.27	0.37	0.27	2.13	0.97	1.33	0.36	0.35	0.26	2.96	3.50	1.53	0.25	0.88	0.28	3.82
	2.59	0.44	0.12	2.89	0.54	0.19	0.59	0.39	0.46	0.64	0.49	3.32	2.19	0.33	0.36	1.12
Acute diarrhoea in children under 2 years	1.30	0.76	0.78	0.36	0.93	0.96	0.84	0.52	1.64	1.71	1.81	0.92	1.70	1.94	0.76	0.76
	0.94	0.79	1.17	1.36	0.85	1.19	0.98	1.36	1.17	1.12	1.92	0.81	0.97	1.14	1.97	0.92
Scarlet fever	2.49	0.76	0.36	2.14	0.72	1.38	1.17	1.82	0.87	0.71	1.58	1.46	0.38	2.87	0.69	0.84
	0.94	1.18	0.76	0.92	0.84	0.92	1.20	1.78	0.64	0.52	1.74	1.20	1.96	0.63	0.85	1.18
Bacterial meningitis and/or encephalitis	0.94	0.72	0.53	3.46	0.76	1.27	1.37	1.15	1.15	1.82	1.74	1.50	0.82	1.44	0.52	1.46
	1.43	1.19	1.13	1.89	1.80	0.88	0.56	1.38	1.14	0.92	0.83	1.18	1.98	1.75	0.83	1.48
Viral meningitis	0.83	0.90	0.44	1.13	0.29	1.41	0.77	1.14	3.13	4.85	1.32	0.47	0.45	1.39	0.54	2.67
	1.27	0.91	0.46	1.58	0.74	0.75	0.44	1.88	1.72	4.47	1.15	0.44	0.83	2.75	0.79	1.63
Viral encephalitis	0.92	0.19	0.23		0.25	0.15	0.80	2.26	3.27	1.42	1.41	0.39	0.29	3.57	0.62	0.75
	0.93	0.56	0.82	0.14	0.75	0.55	0.57	0.95	0.98	1.66	0.48	0.50	1.65	3.38	0.43	0.82
Mumps	0.36	1.16	1.23	0.32	1.00	0.98	0.99	1.22	0.71	0.52	0.36	1.93	1.28	0.71	1.33	0.87
	0.82	1.32	1.52	1.23	0.72	0.87	0.86	1.39	0.85	1.66	0.84	1.14	1.82	0.76	0.94	1.37
Trichinellosis		1.93	0.43	1.33						0.56					6.24	0.41
	0.67				17.11			3.94								

Source: authors' elaboration based on the statistical database of the Central Statistical Office in Warsaw.

Note: DL - Dolnośląskie, KP - Kujawsko-Pomorskie, LUL - Lubelskie, LUS - Lubuskie, LO - Łódzkie, MP - Małopolskie, MZ - Mazowieckie, OP - Opolskie, PK - Podkarpackie, PD - Podlaskie, PM - Pomorskie, SL - Śląskie, SW - Świętokrzyskie, WM - Warmińsko-Mazurskie, WP - Wielkopolskie, ZP - Zachodniopomorskie.

Tab. 3. Estimates of the effects for the *SSA* — the summary of static and dynamic approach with a comparison [%]

Voivodship	*SSA* effect for static approach			*SSA* effect for dynamic approach			Module differences of effects		
	Net	Structural	Local	Net	Structural	Local	Net	Structural	Local
DL	16.97	42.30	-25.33	15.40	56.35	-40.95	0.38	14.05	15.62
KP	-21.20	-14.56	-6.65	-4.48	9.55	-14.02	18.41	24.10	7.38
LUL	-29.92	-22.12	-7.79	-23.37	78.27	-101.64	7.30	100.39	93.84
LUS	103.48	24.42	79.06	124.96	24.36	100.60	27.67	0.06	21.54
LO	-1.58	4.64	-6.23	13.21	-7.35	20.55	15.53	11.99	26.78
MP	36.93	2.61	34.32	100.40	-3.78	104.18	63.58	6.39	69.86
MZ	20.00	0.52	19.48	26.76	11.06	15.70	7.12	10.54	3.78
OP	-6.13	-15.12	8.99	9.74	-25.17	34.90	17.01	10.05	25.92
PK	-0.20	19.54	-19.75	4.93	21.29	-16.37	6.85	1.75	3.38
PD	12.65	31.85	-19.21	16.81	-11.87	28.69	6.95	43.73	47.89
PM	60.22	49.49	10.73	61.83	40.80	21.03	3.08	8.69	10.31
SL	-3.24	-6.33	3.09	4.75	8.47	-3.72	7.99	14.80	6.81
SW	-39.96	-16.47	-23.50	-71.88	-69.76	-2.11	31.54	53.30	21.38
WM	-19.69	44.77	-64.45	-34.77	13.24	-48.02	13.18	31.52	16.44
WP	-21.88	-21.84	-0.03	13.17	-53.71	66.88	35.72	31.87	66.92
ZP	21.53	-9.74	31.28	33.66	10.55	23.11	12.86	20.29	8.17
Total effect	127.97	113.96	14.01	291.12	102.30	188.82	Absolute national growth rate difference		
National growth rate			-27.29			-14.72			12.57

Source: authors' elaboration based on (the statistical database of the Central Statistical Office in Warsaw).

Note: abbreviations as in Tab. 2.

Małopolskie. The unfavourable situations resulted mainly from the local conditions and regional factors. The estimates should be of particular interest to local authorities.

The differences in estimates resulted from *SSA* approaches applied in the research and should be labelled as significant, indicating the preference for a complexed, and at the same time, more accurate dynamic analysis.

4. Discussion of the results

It is complicated to receive reliable data on healthcare infections to calculate their direct impact on the economy and society, with direct and/or indirect cost for the system. As already mentioned, the research indicated that various Authors focus on the issue of infections differently; at the same time, the data accessibility differs depending on the aim of analysis. These implications result from the fact that each infection incidence has its conditioning, for example, location, environmental determinants, and different origin. The database of the European Centre for Disease Prevention and Control (ECDC) indicates that it is possible to reduce the number of infection cases. This is also confirmed by this paper. It is undeniable that there was a significant decline in the number of infection cases. The differences in estimates, however, indicated the use of more complex methods, such as stochastic *SSA* approaches or spatial *SSA* analyses.

Hoppes (1997) indicated that the use of the *SSA* results was important due to possibilities to investigate the general trends (the national growth rates), the influence of a disease (structural growth rates), and the local conditions (the competitive advantage/disadvantage). Clearly, the specific *SSA* results may turn out useful in the design of preventive health programmes, allowing the forecast of their scope, range and location.

Positively, from the perspective of the society, it should be evaluated that the national growth rate is

negative, which indicated the decrease in the number of incidence of infections. However, while interpreting the values of section net rates (for a specific disease), one can conclude that in some instances, the number of cases increased rapidly, for example, measles, whooping cough, scarlet fever or acute diarrhoea in children under two years of age. This necessitates considering the results of the dynamic approach as more reliable as the same conclusion was derived from the research on health-related causes of deaths (Jewczak & Żółtaszek, 2011).

The analysis was also performed for rates of incidence of infections in conversion to the number of regional inhabitants to confirm the correctness of previously adopted schemes. Although there were no significant differences, one should bear in mind that the state of being infected might not be recorded in a location of permanent residence that is the evidence for further spatial/territorial modifications of the Shift-Share Analysis.

Conclusions

Summarising the analyses and research, it should be emphasised that the spatial concentration of infections weakens in time, which could be indicative of positive changes for the economy (the budget), healthcare (the system), and society (the patients). This conclusion might be beneficial from the perspective of the healthcare sector due to easier predictive scenarios for future infections and possible centres of the increase in incidence as well as the economic and societal costs. Moreover, results showed that for some types of infections, a location played an important role. This assumption was indirectly confirmed by the documentation of the European Centre for Disease Prevention and Control.

Although the *SSA* does not indicate the factors influencing the level of infection cases or their spatial distribution, its results are useful to identify and categorise the reasons for observed changes, helping to make justified decisions, while allocating the resources in the healthcare system.

The Shift Share Analysis indicated regions that experienced relatively higher rates of changes in the number of reported cases: the growth rate amounted to -27.29% for static and -14.72% for the dynamic approach and in both cases, the estimates confirmed a decrease in time, which implies a higher safety of local societies. Beside the net growth (or the net effect), the *SSA* revealed the background of those fluctuations, whether it was an influence of local conditions or structural (typological) changes. Especially, those results should be wisely adapted, for instance, in preventive strategies of local or national governments.

Finally, the results also confirmed the disadvantage of static approaches in favour of more developed, accurate approaches. The estimates showed that applying the constant distributional rates for the analysis of the phenomena of high volatility results in revalued levels of net, structural and local effects.

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 5 December 2016
accepted: 30 May 2017

pages: 32-37

Network analysis approach to stroke care and assistance provision: an empirical study

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ABSTRACT

To model and analyse stroke care and assistance provision in the Portuguese context from the network perspective. We used the network theory as a theoretical foundation for the study. The model proposed by Frey et al. (2006) was used to elicit and comprehend possible interactions and relations between organisations expected to be involved in the provision of care and assistance to stroke patients in their pathway to rehabilitation. Providers were identified and contacted to evaluate the nature and intensity of relationships. Network analysis was performed with the NodeXL software package. Analysis of 509 entities based on about 260 000 entries indicates that stroke care provision in the evaluated context is best captured in the coalition-collaboration setting, which appears to best demonstrate the character of the network. Information from analysis of the collaboration stage was not sufficient to determine the network dynamics. Application of the network theory to understand interorganisational dynamics of the complex health care context. Empirical validation of the model proposed by Frey et al. (2006) in terms of its operationalisation and the way it actually reflects the practical context. Examination and analysis of interorganisational relationships and its contribution to management of compound health care context involving actors from various sectors.

KEY WORDS

network analysis, care and assistance provision, stroke

DOI: 10.1515/emj-2017-0011

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Introduction

Over last decades, the world has been undergoing changes, which have a more or less immediate and direct impact on the way we are living now. Demographic, socioeconomic and epidemiologic challenges have been putting increasing pressure on policy makers (Pierson, 2006) requiring a shift in the paradigm of care provision. Traditional orientation towards acute care has been challenged to give an appropriate response to multiple chronic and long-term health conditions, the prevalence of which increases with age. The escalation of demand for complex and multidisciplinary care services has requested suggestions of methodologies and tools to improve coordination and continuity of care (Andreasson & Winge, 2010).

The elderly population in Portugal represents the largest and the fastest growing population group in the country. It is estimated that between 2005 and 2030, the number of Portuguese aged 65 and above will increase from 16.9% to 23.3% and those aged 80 and older will increase from 3.7% to 6.4% of the total population (Eurostat, 2008). The conditions in place to deal with this scenario are not promising. The economic and financial crisis has led to economic stagnation, insolvencies and a wave of emigration. Labour market participation among Portuguese women is currently one of the highest in the European Union (Eurostat, 2010), affecting the capacity of informal care provision.

The World Health Organisation (WHO) reports 15 million cerebrovascular accident cases annually (Mackay & Mensah, 2004) causing 5 million deaths. In Portugal, stroke accounts for three deaths per hour (Sá, 2009). To survivours, it is an important factor leading to disability and dependency in activities of daily living (Moutinho et al., 2013) with high costs to the patient, relatives and care systems (WHO, 2010), and a source of physical and emotional burden. Stroke is a vital issue in public health policy (Truelsen et al., 2006) and requires a collaborative approach to patient-centred care provision.

Structures of care provision in Portugal exist under the Ministry of Health responsible for health care services and the Ministry of Labour and Social Solidarity, responsible for social benefits, such as pensions, unemployment and incapacity benefits. Ideally, the systems should be complementary. In the case of a stroke patient, the network of care may consist of a range of entities: hospitals, rehabilitation units of different types, health centres, Social Security (a relevant source of information about financial support for patients and families), Private Institutions of Social Solidarity (IPSS, non-profit organisations directly providing a large part of social and family services), Misericórdias (charitable organisations operating according to Catholic principles with an important role in social assistance to the community), religious entities (moral, financial and material support), city and parish councils (expected to provide for instance technical support), fire departments (offering transportation services on the basis of cooperation agreements), and physiotherapy clinics and other private service providers relevant to the patient (e.g. gyms). Some of these entities operate within the National Network of Integrated Continuous Care (RNCCI), a network created in 2006 that combines teams providing long-term care, social support and palliative activity with its origins in community services (Barros & Simões, 2007). The network comprises convalescence units, medium-term care and rehabilitation units, long-term care and maintenance units, palliative care units, and day care and autonomy promotion. It promotes coordination between different institutions of care, with early referrals and patient's condition monitoring.

This paper addresses the examination of the structure of stroke care and assistance provision in the Portuguese context with the use of the network theory and analysis. It is organised as follows. Section 1 presents a short literature review regarding the network theory and network analysis introducing appropriate metrics to be used. Section 2 describes research methods. Section 3 presents results of our study, which are then discussed in Section 4. The final section provides conclusions and implications.

1. Literature review

The basic sociological concept of a network was given by Mitchell (1969) as a specific type of relationship (ties) that links a group of people, objects or events (vertices or nodes). A network is hence composed of ties and nodes and aims to depict some relationships between the nodes. The network theory is a formal theory that when applied to the organisational domain is based on the assumption that organisations operate in the market through interdependence built upon mutual relationships.

Network analysis is a set of techniques developed to study how individuals, groups, organisations and communities connect and interact with each other (Wasserman & Faust, 1994). It focuses on the analysis of patterns of relationships between the network elements and the way these patterns can be used to value processes and performance. A variety of measures drawn from network analysis literature has been used to uncover patterns within the social structure.

Network density is the average strength of connections among units in the network or a proportion of ties which are present relatively to those which are possible in a certain setting and is one of the most common indices of the network structure. It permits the assessment of the solidity of the network and the verification of the presence of subgroups (Palazzolo et al., 2011).

A great amount of recent research on networks has focused on centrality patterns that emphasise

a relative position of nodes within the network. Freeman (1979) has concentrated on different types of centrality and presented a relevant conceptual review of degree-based measures, betweenness and closeness. The basic approach to degree-based measures is network size and communication activity. Degree centrality is based on some direct ties of the vertex. Betweenness centrality is an indication of the strategic importance of actors within the network and points out the capacity to control the network or disrupt communication. Higher betweenness centrality indicates that fewer actors provide bridging roles across the network (Lewis, 2005). Closeness centrality refers to the extent to which an individual part of the network can reach all other members of the network in the fewest number of direct and indirect connections. Closeness measures reveal individual autonomy and freedom from the control of others. Direct links are considered 'closer' than indirect (Brass, Butterfield & Skaggs, 1998). Density and centrality are important complementary measures.

The potential of network analysis application to health and social care system interactions is yet to be reached (Luke & Harris, 2007). The literature describes some networks in health and social care focusing on interventions addressing public health matters, especially about common issues such as determinants of health. Rutten and Boekema (2004) argue that nowadays health and social care organisations act similarly to those of other sectors and perceive the collaborative environment as a way to exchange knowledge, skills and build synergies. Therefore, network theory and analysis seem a promising approach to the study such complex arrangements.

2. Research methods

The present research was carried out as a part of a larger study which involved the evaluation of a range of aspects of the stroke care network from both the demand and supply sides. The first phase of the study (the demand side) was done within the Portuguese branch of HOMECARE (Clinical Continuity by Integrated Care) EU-funded project [FP7-Homecare 222954] that has validated an early home supported discharge procedure for stoke patients through a randomised controlled trial (Santana et al., 2016). The second phase of the study (the supply side) involved stroke care and assistance providers in the district of Aveiro who were asked to appraise the network from their perspective. Care providers were identified through a comprehensive search starting with those identified earlier by the patients admitted to the HOMECARE trial and then by use of miscellaneous sources. The snowballing method was used to gather information on entities less accessible through general databases (e.g. physiotherapy clinics).

Identified entities were listed and contacted over the phone to confirm their current situation (active/inactive) and services they provided (whether adequate for stoke patients). Each organisation that agreed to participate in the study was requested to assess its relationships with other members of the network. The data collection took four months (March–July 2014).

The model proposed by Frey et al. (2006) was used as a framework to organise data on nature and strength of relationships between stroke care and assistance providers. It was considered the most suitable as other available models were either too restricted or too broad. Besides networking (stage 1), cooperation, coordination, coalition and collaboration (stages 2 to 5, respectively), Frey et al. (2006) recognise that no interaction might exist between entities.

Data analysis was performed with the NodeXL version 1.0.1.332 software. NodeXL is a network analysis software package integrated into Microsoft Excel 2007, 2010, 2013 and 2016. It intends to collect data in a format of class libraries and to analyse and visualise them in an output of networks.

3. Research results

The analysis was performed on the database consisting of 509 vertices representing entities effectively providing care and assistance to stroke patients in the district of Aveiro. For all identified relationships, there were 58 559 edges that connected the vertices. The database demonstrating the strength of linkages between each entity in the study contained circa 260 000 entries. Graphs were laid out using the Fruchterman–Reingold layout algorithm.

The strategy for the analysis was to gradually eliminate the weakest relationships. The analysis started with the global network and evaluated remaining configurations, systematically removing lower levels of interaction. The number of entities

Tab. 1. Metrics of the relationship settings

Setting	In-degree and out-degree mean	Betweenness centrality mean	Closeness centrality mean	Graph density
Networking-collaboration (global network)	198.33	186.99	0.001	0.39
Cooperation-collaboration	28.14	649.04	0.001	0.06
Coordination-collaboration	7.19	842.96	0.007	0.02
Coalition-collaboration	1.23	12.91	0.145	0.006

Source: authors' elaboration based on (Frey et al., 2006).

decreased from 509 in the global network to 222 in the coalition-collaboration setting and 44 in the collaboration setting. Table 1 presents network metrics of the analysed settings. Means of in-degree (number of connections to a vertex, that is, the number of links in the direction of an institution) and out-degree (number of connections toward other vertices, that is, directed to other institutions of the network) fell from 198.33 in the global setting to 1.23 in the coalition-collaboration setting. In the global network, there were about 175 institutions which did not contact any other institution. This ratio increased in the coordination-collaboration setting (340 from 483). In the coalition-collaboration setting, there were still about 100 from 222 that did not contact any other institution.

In the setting of the highest relationship intensity, 35 from 44 institutions indicated to have only one connection with other members of the network. There were three major entities of similar degree and centrality, all of them city councils. These three nodes formed a group of a relatively high influence. The first had 11 connections and the second — 8 connections; the last one was less 'central'. Parish councils and IPSS were the most present entities at this stage. Hospital Infante D. Pedro, the central hospital in the district of Aveiro, where the stroke unit was located, was not considered by the network members as a highly collaborating entity. The network characteristics in the collaboration setting, given the number of members and type of relationships, affected the potential of further analysis.

As betweenness centrality has no limits, the metric values were compared among considered configurations. Along the process of decreasing the number of linkages and limiting relationships to a more intense nature, mean of betweenness centrality increased to substantially drop in the coalition-collaboration configuration. In that setting, just a few entities had strong connections. These presented highest betweenness centrality what made them the 'closest' to all other nodes. Still, the degree centrality was low (21 connections with other institutions of the most connected city council). Vertices with high betweenness centrality are frequently located at the crossing of two or more high dense network groups. This is an indication that at the coalition-collaboration level, the structure of the network meaningfully changed in terms of connectivity between institutions.

The closeness centrality remained very low through the configurations. One characteristic of this metric is attributing high scores to nodes located near the centre of local constellations of nodes, that is, local communities, within the overall network. The results clearly point out the continuous high density of the network and a close distance from the centre of the group. The graph density, as a proportion of existing ties to possible ties, has decreased with eliminating weaker relationships, reaching 0.006 in the coalition-collaboration setting.

4. Discussion of the results

Social relationships in Portugal have been strongly marked by economic factors and the cultural shift leading to social disintegration and affecting informal care capacity in a context where it is increasingly needed. The care system is under pressure to respond to comprehensive needs as well as organise resources and processes of care provision around a patient. As a result, the RNCCI was launched in 2006 as a formal organisational model providing integrated health and welfare services in a situation of dependency and autonomy failure. Other disease-specific or issue-specific programmes of a more limited scope have also been implemented.

Collaborative action is perceived as an opportunity to create competitive advantages and has received increasing attention over last years (Lim & Tang, 2000). Relations of collaborative nature among organisations within and between sectors have been

a subject of interest of health and social care (Greenwald, 2008) and seen as a reasonable response to comprehensive care needs. The intersectoral level is characterised by particular complexities, such as community approval, assuming commitment, structures and processes, and adequate control and evaluation measurements (Kreisel & Schrinding, 1998).

Network analysis application in social sciences is a proof of a shift from the traditional individualism towards structural analysis (Garton, Haythornwaite & Wellman, 1999). From typical units, such as elements and their attributes, the focus is changing to the type and structure of the underlying relation. With the network theory and network analysis, we were able to apply and empirically validate the model proposed by Frey et al. (2006) capturing existing interactions between stroke care and assistance providers.

Network analysis application in the context of stroke care and assistance has revealed providers' perceptions of existing linkages. The coalition-collaboration setting has appeared the most suitable to reflect the network dynamics. Understanding the structure and patterns of interactions between providers can bring rich and valuable insights to the process of management of complex health care context within intersectoral perspective.

The applied model seemed to cover aspects of interorganisational relationships adequately to the complexity of care and assistance needs springing from long-term and chronic health conditions. However, we do acknowledge some challenges we faced. Despite the provided short explanation, the coalition phase was identified as confusing to care and assistance providers. Another issue was related to collaboration, which Frey et al. (2006, p. 387) specified as a level, on which 'consensus is reached on all decisions' and 'members belong to one system'. A term suggested as more suitable to that description was 'integration'. In a multiple-setting and networked multi-agent context towards which the current care systems are tending, this approach may be, however, infeasible and unmanageable as not all systems, organisations or services can be integrated.

Conclusions

An enormous increase of chronic and long-term conditions in last decades is a global phenomenon calling for substantial organisational shifts in care provision and proposing methodologies that would reflect this new reality. With a complex nature at the system, organisational and individual levels, effective provision of care and assistance services requires formal recognition and a strategic adaptation of multiple action agendas. Network analysis brings an interesting methodological perspective into the multi-stakeholder and cross-sectoral setting and offers practical implications. Practice based on robust and coordinated interactions could result in better health outcomes, provide a better quality of care and enhance patient satisfaction.

Acknowledgements

The paper is a result of research conducted in two phases of which the data for phase one were collected within the Portuguese branch of HOMECARE (Clinical Continuity by Integrated Care) EU-funded project [FP7-Homecare 222954]. NS acknowledges the support of the FCT – the Portuguese Foundation for Science and Technology [grant number SFRH/BD/69892/2010].

This work was financially supported by the Research Unit on Governance, Competitiveness and Public Policy (project POCI-01-0145-FEDER-006939), funded by FEDER funds through COMPETE2020 – Programa Operacional Competitividade e Internacionalização (POCI) – and by national funds through FCT – Fundação para a Ciência e a Tecnologia.

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 10 October 2016
accepted: 25 May 2017

pages: 38-43

Physician appraisals: key challenges

Jacek Klich

ABSTRACT
The main purpose of the article is to identify key criteria being used for physician appraisals and to find how communication skills of physicians are valued in those appraisals. ScienceDirect and EBSCOhost databases were used for this search. The results show that a physician appraisal is underestimated both theoretically and empirically. The particular gap exists with respect to the communication skills of physicians, which are rarely present in medical training syllabi and physician assessments. The article contributes to the theoretical discourse on physician appraisals and points out at the inconsistency between the high status of physicians as a key hospital resource on the one hand and, on the other hand, at inadequate and poorly researched assessment of their performance with a special emphasis on communication skills. The article may inspire health managers to develop and implement up-to-date assessment forms for physicians and good managerial practices in this respect in hospitals and other health care units.

KEY WORDS
physician appraisal, physician assessment, communication skills

DOI: 10.1515/emj-2017-0012

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Introduction

This paper originated from both theory and practice. The theoretical aspect was connected with a paper recently published by Schumacher et al. (2016), which concluded that the assessment of physician performance across the continuum of training and practice in the USA was inadequate. Considering that when it comes to employed physicians, employee performance evaluations are often an exception rather than the norm (Jessee, 2016) just these two assessments speak for further inquiry into physician appraisals. The practical aspect appeared in discussions with physicians during the author's lectures on management of health care units within the framework of postgraduate studies on management in the healthcare sector in the Collegium Medicum, Jagiel-

lonian University, Cracow, Poland. The students pointed out having rather weak communication skills especially (but not exclusively) while in contact with patients. Such a negative self-assessment of Polish physicians may give rise to a concern since in the United States, the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties (ABMS) jointly identified interpersonal and communication skills as one of the six general competencies for physicians (Batalden et al., 2002; Horowitz, 2000). Consequently, the aim of the paper is to answer two broad research questions: what are the basic elements of a physician performance evaluation? and how a physician's communication skills are weighted?

1. Literature review

Having in mind that this is a review article, the literature overview constitutes its core element and is presented under 3. Research results below. Here, just one finding should be mentioned. It says that not only physician assessment but the whole human resource management in the health sector is weak (Kanellopoulos, 2012). This, in turn, raises further questions regarding the causes for this, keeping in mind that employees in the health care sector in general and physicians, in particular, are perceived as the most precious assets and/or key success factors of hospitals and other health care providers. Such a statement further legitimises physician appraisals as the research topic. An appraisal is defined here as a process to provide feedback on the performance of doctors, chart their continuing professional development, and identify their developmental needs (Appraisal for Doctors in Hospital Practice, 2006, p. 2).

2. Research methods

This review article is based upon the contents of two databases: ScienceDirect and EBCSOhost. The following keywords were used for search (in various combinations): physicians, appraisal, assessment, performance, communication skills, and peer assessment. The search was narrowed down to title, abstract and keywords. With a few exceptions, the period for the search was narrowed to 2006–2016. The two-step selection process was used. In the first stage, records were assessed based on the correspondence to the topic and appropriateness. In the result, 274 records were identified. In the second stage, all abstracts were read. Finally, based on the content of abstracts, 42 articles were found to meet the inclusion criteria and were analysed in-depth.

3. Research results and discussion

Although topics connected with managing physicians are represented in the literature (maybe in slightly less extent than, for example, management of nurses), the more specific issues about physician assessment and appraisal are comparatively less represented. While most organisations conduct employee performance evaluations at least annually, and, generally, use a standard evaluation tool, in hospitals, evaluations of employed physicians are rare, and evaluation tools differ considerably (Jessee, 2016).

Parallelly, one may observe an increased emphasis on the individual performance of doctors in improving the quality of healthcare (Klass, 2007). Here, medical competences of physicians take the lead followed by their performance. Competence in medicine is understood as the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served.

3.1. Elements of a physician assessment

Epstein and Hundert identified seven dimensions of professional competence of a physician: cognitive, technical, integrative, context, relationship, affective/moral, and habits of mind (Epstein & Hundert, 2002, p. 227). Within the framework of relationship the following categories were identified: communication skills, handling conflict, teamwork, teaching others: patients, students, and colleagues (Epstein & Hundert, 2002, p. 227).

In the United States, the assessment of medical residents and increasingly medical students is largely based on a model that was developed by ACGME. This model uses six interrelated domains of competence: medical knowledge, patient care, professionalism, communication and interpersonal skills, practice-based learning and improvement, and systems-based practice (Batalden et al., 2002). Klass

(2007) distinguishes between four main frames of assessment of a physician competence:

- assessments undertaken before actual practice (achievement tests and simulations, including practice under supervision, which permit evaluators to predict future competence of a trainee),
- competence in practice from participation in continuing medical education and training programs or related achievement tests, measures that examine work processes of a physician (peer reviews of medical records, surveys of co-workers and colleagues about a physician's communication skills and collaborative practices),
- assessments that use standardised patient data, diaries, or portfolios to add contextual detail about work activities,
- assessments of the outcomes of a doctor's work, including patient satisfaction surveys, complaints or malpractice claims, specific markers of patient outcomes or wellness, and data on mortality and morbidity.

Addressing the issue of principles applicable to the assessment of physicians and answering the question what to assess, Epstein (2007) pointed out eight measures: habits of mind and behaviour, acquisition and application of knowledge and skills, communication, professionalism, clinical reasoning and judgment in uncertain situations, teamwork, practice-based learning and improvement, and systems-based practice (Epstein, 2007, p. 394).

Among the most common measures of physician performance, clinical skills get the lead. Jessee (2016) identified here nine measures: patient relationships, peer and colleague relationships, support staff relationships, patient recordkeeping, patient compliance, sensitivity to patient language and cultural differences, behaviour, citizenship, and support for quality improvement initiatives.

Other authors proposed an extensive list of various methods and tools of physician assessment including: simulated patients, video observation, direct observation, peer assessment, audit of medical records, portfolio or appraisal (Marjan et al., 2007), practice audits, practice visits (Contencin et al., 2006), case-based discussion, assessment of clinical expertise, mini-assessed clinical encounter, mini peer assessment tool, direct observations of procedural skills, patient satisfaction questionnaires, case conference, and journal club presentation (Brittlebank et al., 2013). Peer assessment and feedback are an important part of professional development (Sargeant et al., 2013), and peer-assessment tools are used during various stages of careers of health professionals (Lull et al., 2016), by different specialists (Violato & Lockyer, 2006; Sasaki et al., 2015; Teter et al., 2016; Kemper et al., 2014), and/or in respect to different treatments (O'Shaughnessy & Joyce, 2015; Bender et al., 2009). It is worth to notice, however, that the instruments developed for physicians to evaluate characteristics of colleagues need further improvement (Evans et al., 2004).

The importance of organisational and cultural differences notwithstanding, one may maintain, that some already existing tools like communication assessment tools (CAT) can be used by various health care providers (Stausmire et al., 2015), and some of the peer-review tools, for example, SPRAT (Sheffield peer-review assessment tool) proved to be useful internationally as well (Sasaki et al., 2015).

In their systematic review, Overeem et al. (2007) identified six different methods of evaluating the performance of an individual physician: simulated patients, video observation, direct observation, peer assessment, an audit of medical records, and portfolio or appraisal. They conclude that little psychometric assessment of the instruments has been undertaken so far and effectiveness of formative assessments is poorly studied. The fact that all six systems but two rely on a single method to assess performance indicates that there is considerable room for improvement in the process of a physician appraisal.

There are recommendations available in the literature. Epstein proposed seven hints regarding the assessment process:

- use multiple methods and a variety of environments and contexts to capture different aspects of performance,
- organise assessments into repeated, ongoing, contextual, and developmental programs,
- balance the use of complex, ambiguous real-life situations requiring reasoning and judgment with structured, simplified, and focused assessments of knowledge, skills, and behaviour,
- include directly observed behaviour,
- use experts to test expert judgment,
- use pass–fail standards that reflect appropriate developmental levels,
- provide timely feedback and mentoring (Epstein, 2007, p. 394).

3.2. Communication skills of a physician

As indicated earlier, communication skills are perceived as an important domain of competence for

physicians. Effective communication is broadly acknowledged as critical to patient satisfaction, outcomes of care and malpractice prevention (Newcomb et al., 2016). Although good communication skills are required from any physician, surgeons need particularly effective communication skills to discuss complicated procedures and help patients make informed choices, which goes far beyond patient satisfaction. Consequently, communication skills of physicians, especially at the beginning of their professional career, get increasing attention in the literature (Taveira-Gomes et al., 2016; Newcomb et al., 2016; Liu et al., 2015). As indicated in the literature, there is a positive association between communication skills of a physician, self-efficacy and performance (Gulbrandsen et al., 2013), which reinforces the necessity to develop communication skills among physicians.

The overall assessment of effective communication skills among physicians is not positive, and the lack of communication skills is diagnosed (Haglund et al., 2015). It is explained by a limited in time training in communication skills, which is not integrated into the curriculum and scarcely contextualised (Deveugele, 2015). It is significant that the evidence on communication skills training is scarce or contradictory (Deveugele, 2015) despite a wide acknowledgement of their importance and weight. Even when surgeons spend the majority of their time educating patients and helping them to make choices providing details about surgical conditions and treatments, they often do not explore emotions or concerns of patients (Levinson et al., 2013). Young physicians seem to value communication skills but very often they are not provided with formal training in this respect (Haglund et al., 2015), which contradicts other findings, such as high appreciation of communication tailored to patients (Mazzi et al., 2015), which, in turn, requires considerable communication skills from physicians.

4. Discussion of the results

Strong empirical results of the research on physician appraisal with a special emphasis on communication skills are scarce. For example, Levinson et al. (2013) got 2794 citations and 74 full-text articles, 21 studies and 13 companion reports; Liu et al. (2015) retrieved 20 studies; Mazzi et al. (2013) reported on one full-day observation with 259 people (but only four interviews were analysed); Taveira-Gomes et al. (2016) researched on 255 students attending the course on basic communication skills but then — after three years — only 68 people from the same population completed the re-evaluation interview. Stausmire et al. (2015) researched 93 residents (representing 59 institutions) participating in the communication training but finally only 11 of them volunteered to participate in a role-playing session before and after the formal teaching session. This leads to the statement that research on communication skills of physicians is in its initial stage and should be intensified.

Conclusions

Based on the above, one may conclude that:

- physician appraisals are underestimated both theoretically and empirically despite their objective high importance and weight,
- often assessment tools and instruments in use (especially in peer assessment) lack reliability and validity testing,
- peer-review constitutes a valuable and useful tool for physician appraisals,
- despite the acknowledged (and proved) importance of physician communication skills, this area leaves considerable room for improvement. There are several challenges faced by health care managers and physicians, to mention just two:
- there is a need to address training around the management of performance issues to improve the experience for both the appraiser and the appraisee (Cohen & Rhydderch, 2010),
- the shared interprofessional learning model seems promising as an effective method for developing person-centred communication skills but must be further developed (Cavanaugh & Konrad, 2012).

There are many questions which still remain unanswered but should be addressed by researchers, for example:

- How to assess interprofessional teamwork (Chesluk et al., 2015)?
- How to use Electronic Medical Records (EMR) for better assessment?
- How to measure communication skills of physicians in an online environment?

All the above proves that appraisal of physicians in general and their communication skills in particu-

lar constitute an attractive and largely unexplored field of research.

Acknowledgements

This article has been developed within the framework of research Human Capital Management in Hospitals, which is financed thanks to the resources of the Polish National Science Centre (NCN) on the basis of Decision No. DEC–2013/11/B/HS4/01062.

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 30 September 2016
accepted: 15 March 2017

pages: 44-56

The evaluation of financial standing of medical institutions in Poland

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ABSTRACT
The aim of the article is to identify the criteria and methods for the evaluation of medical institutions. The article uses economic analysis, comparative analysis, and methods of descriptive statistics. The analysis of existing regulations, source materials, and the specific business character of health care entities indicates the need to evaluate these units with particular regard to the criteria such as costs, quality of assets (level of consumption, i.e., wear and tear and modernness), employment, financial liquidity or the level of debt. The results of the study are the basis for the evaluation of the healthcare sector. The value of the article is in showing the direction taken by the evaluation of the financial standing of entities. The ability to use specific criteria and methods of evaluation for health care entities in business practice.

KEY WORDS
financial standing, medical institution, healthcare sector, evaluation

DOI: 10.1515/emj-2017-0013

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Introduction

The subject literature and business practice share two approaches to financial management of health care entities[1]. One approach indicates that medical institutions should be treated as business enterprises, from which it is required to operate according to the fundamental principles of the market economy, not considering the specific nature of health services market (Wiercińska, 2014, p. 5). The second approach suggests that medical institutions are characterised by specific features distinguishing them from other sectors; however, they need to meet the same managerial requirements and the same level of professional

[1] For stylistic correctness, the article uses the term 'medical institution' and its synonyms, such as health care entity, health care providers, etc.

management as organisations in any other field of activity (Rój & Sobiecha, 2006, p. 73). Yet, the recent changes in regulations on medical institutions, the Act on Health Services and certain other acts which entered force on 15 July 2016 (Ustawa..., 2011) mapped out a clear course of action for the financial management of these entities.

The aim of this article is to identify the criteria and methods for evaluation of medical institutions, especially those that operate in the form of SPZOZs — Independent Public Health Care Entities — the traditional status of public health care facilities when not corporatized (Improving the financial sustainability of the hospital sector: towards a systemic approach. Policy Note, 2014, p. 35).

The article discusses the following:

- changes in legal regulations on medical institutions,
- sources of information used in the assessment of the financial condition of health care entities,
- criteria and methods for financial evaluation of medical institutions,
- the financial standing of healthcare sector entities in the years 2002–2014,
- conclusions.

For the purpose of this article, the Author formulates the thesis that financial ratios used to evaluate enterprises can also be applied in the evaluation of medical institutions.

1. Literature review

It is important to underline the Act amending the Act on Health Services and certain other pieces of legislation that entered force on 15 July 2016 (Ustawa..., 2011). One of the amendments prohibits disposal of majority shares in companies managing medical entities, i.e., decommercialization of hospitals. The Act introduces several other regulations, among others, abolishes compulsory insurance against medical events and replaces the term 'enterprise' with the term 'medical institution' as the term clearly referring to medical activity. Moreover, the Act replaces the term 'negative financial result' with the term 'net loss' as a term used in the Accounting Act (Zdrowie ABC). According to the Act, an SPZOZ (Independent Public Health Care Entity) covers the net loss by reducing equity capital. In the case where the equity capital is not sufficient to cover the net loss, the entity is obliged to pay the remainder but not more than the amount resulting from the sum of the net loss and depreciation costs. While in the case where it is impossible to cover the net loss, an SPZOZ undergoes a commercialization or liquidation process (Gazeta Lekarska).

The current Act on Health Services defines economic categories allowing to evaluate independent public health care entities (SPZOZ) but only during their transformation into capital (commercialized) companies. Forming of an SPZOZ on the basis of incomes taken from the financial statement for the last fiscal year and the data on liabilities and short-term investments as of the day preceding the day of submitting an application for registering a capital company in the business register, determines the debt ratio of the SPZOZ (Ustawa..., 2011, pp. 78-80).

The Act defines the debt ratio as the sum of short-term and long-term liabilities, less short-term investments of an SPZOZ to total income (Ustawa..., 2011, p. 71). This ratio is calculated as follows:

$$\frac{L-C}{I} \tag{1}$$

where:

L — long and short-term liabilities,

C — short-term investments (cash and short-term bonds),

I — total income.

The interpretation of the debt ratio in accordance with the position 70 and 71 of the Act on Health Services of 15 July 2016 is as follows (Ustawa..., 2011, p. 72):

- the ratio > 0.5 denotes that the forming entity prior to the day of transformation/commercialization assumes the liabilities of an SPZOZ of the value not greater than 0.5;
- the ratio ≤ 0.5 denotes that the forming entity prior to the day of transformation/commercialization can assume the liabilities of an independent public health care entity (SPZOZ). Liabilities due the longest time covering the total amount together with interests are assumed in the first instance.

The Act on Health Services does not specify more economic categories linked to the financial evaluation of such entities. This means that managers of health care entities face serious problems in defining criteria to determine the scope, standards and methods for the evaluation, regardless of the legal form, e.g., independent public health care entity, budget entity, foundations, associations or research units. Diverse legal forms of medical institutions regulated

by the Act on Health Services significantly impedes on the evaluation process.

Sources of information used in the evaluation of the financial condition determine the possibility of their assessment. A medical institution, such as an independent public health care entity (SPZOZ), prepares financial statements, such as the balance sheet or the profit-and-loss account, and provides additional information. Health care entities that function in the form of budget entities and are governed by the local government unit are included in the statement of the local government unit.

Independent public health care entities (SPZOZs) wrestle with the duality of the law. In terms of the accounting, they should apply the Accounting Act. On the other hand, the accounting is regulated by the provisions of the Act on Health Services and the financial reporting of public finance sector units. Users of the information coming from the accounting, on the one hand, are private equity companies, and on the other hand, however, public entities, such as the National Health Fund (Narodowy Fundusz Zdrowia) or forming entities. From the point of view of independent public health care entities, it is important to underline the fact that the data coming from the accounting may be the basis for taking actions related to their existence, i.e. transformation or liquidation. The Act on Health Services imposes on forming entities obligatory actions that must be taken in the event of a negative financial result of SPZOZs and, consequently, the assumption of liabilities of such entities. Therefore, the accounting of an SPZOZ should be carried out in a way allowing to avoid any disturbances in the evaluation of the financial position and the financial result of such entities (Wawrowski, 2014).

A comprehensive evaluation of the economic and financial situation of health care entities, in addition to basic financial statements, i.e., depending on the legal form, should be made using all internal and external data that are generated for informational purposes or for improving management, etc. (Mioduchowska-Jaroszewicz, 2010, p. 22).

2. Research methods

Financial analysis is one of the instruments used by corporate management. It deals with assessing the financial and economic situation using specific procedures and methods (Pur, Jacova & Horak, 2015, p. 5). Knápkova (2013) stated that financial analysis serves for making a complex assessment of the financial situation in a particular company. Already in 1979, Baruch and Shyam, 'claimed the extensive use of financial ratios by both practitioners and researchers is often motivated by tradition and convenience rather than resulting from theoretical considerations or from a careful statistical analysis. Basic questions, such as: Is the control for firm size, a major objective of the ratio form, called for by the theory examined; what is the structural relationship between the examined variables and size; and what is the optimal way to control for industry-wide factors, are rarely addressed by users of financial ratios'.

The use of analysis ratios is still very popular and has always been an important source of information about the financial health of entities. Determining the performance of a firm with the help of a set of financial measures/ratios has been an interesting and challenging problem for many researchers and practitioners. Identification of factors (i.e., financial measures/ratios) that can accurately predict the performance of a firm is of great interest to any decision maker (Dursun, Kuzey & Uyar, 2013).

The analysis of the financial and economic situation of any entity is essential for its functioning. Due to the specific nature of medical institutions, it is essential to evaluate the economic and financial standing, taking into account the following elements:

- costs,
- the quality of assets (the level of consumption, i.e., wear and tear and modernness),
- employment,
- financial liquidity,
- the level of debt.

The evaluation of costs is an important part of the economic and financial analysis of health care entities. The cost analysis aims to provide detailed information on the costs in various sections, which is necessary for the causal assessment of the present level of costs, for disclosure of reserves, thus setting out the course of action and finding practical measures to increase the effectiveness of management by rational use of disclosed reserves (Waśniewski, 1981, p. 146). Costs in each business activity play an important role since they are the carriers of various economic information necessary for decision making in managing a business entity. They are important measures of performance of a given business activity as they reflect the entire business of the company, i.e., the effects of work on all the stages of creating the value for all stakeholders (Waśniewski & Skoczylas,

2003, p. 209), and in the case of health care institutions, the value for customers or patients.

A preliminary analysis of costs by function and type, performed along with the assessment of the changes in the structure of these costs, only allows determining the items of costs where deviations appeared in relation to the base, not explaining the reasons. This stage of the analysis allows to determine the nature and weight of the revealed deviations (cost reduction or overrun) and paves the way for further causal research (Waśniewski & Skoczylas, 2003, pp. 218-219).

Fixed assets are mainly the subject of the asset quality analysis of health care entities. The assessment of asset quality of health care entities should include:

- the analysis of the size and the structure of fixed assets,
- the evaluation of consumption (wear and tear) and replacement or renewal of fixed assets,
- the study of the efficiency of fixed asset utilisation.

In making strategic decisions on the functioning of the studied entity, it is important to determine the level of and changes in the structure as well as the condition and the size of fixed assets. In the analysis of the size and structure of assets of the health care entity, the following issues should be considered:

- the size of fixed assets (absolute or relative difference ratios, indicators of growth),
- the structure of fixed assets (the ratio of fixed assets to the total value of fixed assets, the ratio of investment to the total value of fixed assets).

The analysis of the size of assets is to indicate how the total value of the assets behaves, whether it increases or decreases. The increase in the value is a positive sign as it means that obsolete fixed assets are properly renewed or replaced. The analysis of the structure of fixed assets should characterise the share of individual groups of fixed assets in the overall size of fixed assets (Jerzemowska, 2006, p. 198). Another crucial element in the evaluation of the quality of assets is the consumption and replacement of assets. Consumption of fixed assets reflects the decrease in their use and the replacement value. The use value decreases gradually over the useful life of assets, while the wear and tear increases. The causes of wear and tear of fixed assets, among others, are the heat or mechanical or chemical actions bringing about internal or external changes, thus inevitably leading to physical deterioration. Usually, these changes occur slowly over time, but may well occur suddenly as a result of excessive dynamic loads. Because of physical wear and tear, technical parameters of fixed assets gradually worsen, which is reflected in frequent breakdowns, higher energy consumption or defects in produced goods. The process also lowers the value of fixed assets (Jerzemowska, 2006, p. 198).

The next step in assessing the quality of assets of health care entities is their efficient utilisation, which should enable (Borowiecki, 1993, p. 99):

- a comprehensive assessment of fixed assets,
- defining the impact of fixed asset utilisation on production and financial results,
- disclosing the existing reserves in fixed assets and indicating the possibilities of their effective use,
- determining the relationship and the optimal ratio between labour inputs,
- predicting the value of production, depending on the decisions relating to technical, economic and organisational objectives within the company.

The analysis of employment in the enterprise is conducted depending on the decision-making needs. Traditionally, it is based on the analysis of employment by a business category of the company and the kind of activities performed by employees. In practice, the evaluation of employment generally includes the assessment of the human capital in terms of changes in the presented classification categories. The analysis of the size and the structure of employment should cover employment flows, remuneration and the factors influencing them as well as productivity and profitability (Jerzemowska, 2006, p. 308).

The analysis of professional qualifications is the most important part of the employment analysis of health care entities. Professional qualifications are determined by such factors as theoretical knowledge, experience connected with vocational education, practical skills and work experience. Many of the qualifications are determined by qualitative factors, but their measurement is difficult or can be evaluated by descriptive methods only. Therefore, the assessment of personnel qualifications is usually limited to the study of the level of education and work experience.

For the analysis of the human capital, it is important to assess the employment flow rate. In assessing this factor, special attention is paid to redundancies and hiring new staff. In medical institutions, special attention is paid to the flow of workers mainly due to two factors. These are, firstly, justified redundancies, i.e., collective redundancies causing cost increase due to redundancy pay, reducing the number of employees due to technical and organisational changes or redundancies due to objective reasons. Secondly,

from the perspective of employers, undesirable or unjustified redundancies, among others, due to resignations at an employee request, dismissal of employees on disciplinary grounds or job abandonment. Unjustified redundancies result in a significant increase in costs connected with hiring and training of new employees. Moreover, they adversely affect the morale and work discipline, job performance, and production. The main determinant of undesired redundancies is poor management of human capital resulting from abnormal remuneration policy, limited opportunities for promotion and raising qualifications, unsatisfactory social and living conditions, low job security and a stressful work atmosphere. Undesired redundancies are also the effects of labour discipline violations.

The assessment of the employment flow should be carried out based on the comparative analysis in time, and it should have a downward trend. The employment flow rate at the level of 15% is an indication that in the studied company the management of human resources is incorrect and that the value of this indicator should be decreased (Jerzemowska, 2006, pp. 309-310).

Another crucial issue considered in the analysis of employment is the assessment of remuneration due to importance in motivating employees to achieve aims of the company. It is also a powerful communication tool because the paid amount informs employees of how the company evaluates their contribution in generating the company's value, how much it is willing to pay for it, and what requirements must additionally be met by workers to receive a higher pay.

The assessment of labour efficiency in a health care entity is a reflection of human capital effectiveness. The concept of the effectiveness of human capital refers to the means of measuring and expressing the results of human labour. In general terms, labour efficiency is a measure of production, expressed in the natural or contractual unit or in terms of value achieved over a time unit. In practice, labour efficiency is measured by referring the amount of revenues to an average employment.

The assessment of labour efficiency should be complemented with the analysis of labour costs, which should include: the study of the labour costs and their changes over time as well as the structure and dynamics of the components and links between the labour costs and job performance (Jerzemowska, 2006, pp. 312-314). The evaluation of employment, taking into account the abovementioned aspects, allows to perform a multidirectional analysis of human resources and contributes to raising the efficiency of health care entities.

The most important current problem of any type of business, as well as healthcare institution operating in a market economy, is to maintain liquidity, i.e., the capacity for timely payment of liabilities. The aim of liquidity management is to enable the achievement of objectives such as (Wędzki, 2000, p. 110):

- maximising profits or minimising costs,
- maintaining a minimum level of cash,
- maintaining a minimum level of inventory,
- reaching a target value of the current ratio,
- reaching a target value of the quick ratio, the share of current liabilities in assets and debt service coverage ratio.

The analysis of liquidity should be performed in two stages, i.e., firstly, static analysis based on the study of liquidity derived from the balance sheet, and secondly, dynamic analysis based on the assessment of the cash flow statements (if published by the entity). Liquidity ratios, comparing the company's most liquid assets to the potential chargeability potential, offer a quick way to assess the degree to which the economic entity meets short-term obligations (Vasiu, Baltes & Gheorghe, 2015, p. 188).

The static analysis of financial liquidity was to determine the degree of relationships between individual components of assets and liabilities and to organise them according to the degree of timeliness (Waśniewski & Skoczylas, 2003, p. 429). The items taken under consideration in the dynamic analysis of financial liquidity are, for instance, the preliminary assessment of a financial situation, ratio analysis of the cash flow structure, cash sufficiency and cash performance (Sierpińska & Wędzki, 2001, p. 52).

The level of debt is an important factor for managers, as it informs them of the possibility of being granted another loan by creditors and for investors who want to know whether the company is not too heavily indebted. It is one of the basic criteria for evaluating the financial situation of the company as well as a factor affecting its solvency. (Mioduchowska-Jaroszewicz, 2007, p. 352). In the case of financial ratios, the debt ratio (1), as enshrined in the Act on Health Services (Ustawa..., 2011), should always be considered.

Tab. 1. Formulas of the ratios used in the analysis of the healthcare sector

Name	Abbr.	Formula
Return on Operating Assets	RoOA	Operating Income / Average Operating Assets
Return on Equity	ROE	Net profit / Average Equity
Net Profit Margin	NPM	Net Income / Net Sales (revenue)
Economic Return on Sales	EROS	(Operating Income + Depreciation) / (Sales Income + other Operating Incomes)
Current Ratio	CR	(Current Assets-Long Term Receivables)/Current Liabilities
Quick Ratio	QR	(Short term Investments + Short-term Receivables - Long term Receivables) / Current Liabilities
Cash Ratio	CHR	Short term Investment / Short-term Liabilities
Receivables Collection Period	RCP	(Average short term Receivables*365) / Sales Income
Liabilities Payment Period	LPP	(Average short term Liabilities*365) / Sales Income
Inventory Turnover	IT	(Average Inventory*365) / Sales Income
Equity to fixed assets ratio	EFA	(Equity + Long term Reserves) / (Fixed Assets + Long term Receivables)
Sustainability of Financing	SoF	(Equity + Long term Liabilities + Long term Reserves) / (Fixed Assets + Long term Receivables)
Total Debt	TD	Liabilities and Reserves for Liabilities / Total Assets

Source: own elaboration based on (Zaleska, 2005, pp. 78-81; Waśniewski & Skoczylas, 2004, pp. 310-318; Mioduchowska-Jaroszewicz, 2005, pp. 73-76).

3. Research results

The analysis of the financial standing of any entity should be based on comparisons. The simplest kind of comparisons are, of course, comparisons over time and according to a plan (i.e., when medical entities draw up plans and forecasts). Comparisons in space are often a problem not only for the assessment of the financial position of healthcare institutions but also of other types of businesses. Since 2005 Rachunkowość (Accounting Magazine) has published indicators, covering the data from the year 2002; thus, filling the information gap and allowing to make comparisons in space. Sector indicators published in Rachunkowość include 96 PKD sections (Polish Classification of Activities); thus, it also includes PKD section number 86 since the year 2009 called Human Health Services. The number of study subjects varied from a year to a year and the availability of data. The research used in the article, on which the author bases their research, is based on the number of companies surveyed since 2008. The average number of entities, which differed depending on the survey type, was 532 in 2008, 756 in 2009, 699 in 2010, 1019 in 2011, 592 in 2012, 773 in 2013 and 1244 in 2014.

On this basis, it was possible to conduct the analysis of the financial standing of the healthcare sector based on the assessment of criteria, such as: profitability (operating profitability of assets, equity, net sales and economic sales), liquidity (current, quick, cash, collection period, repayment period and inventory turnover), debt (equity to fixed assets ratio, sustainability of financing, total debt). The financial condition of the healthcare sector in the years 2002–2014 was analysed with the use of standard indicators whose formulas are listed in Tab. 1.

The profitability analysis of the healthcare sector was based on the arithmetic means of the ratios of operating profitability of assets, equity, net sales, and economic sales. The trend of the profitability ratios of using capital and consumption of production factors was significantly volatile in the years 2002–2014. Medical entities were characterised by the highest efficiency of capital and sales in the years 2006–2008. In 2008, the average return on equity was the highest, and it amounted to 29.4%. The weakest return on equity was recorded in the years 2002 and 2003 as it decreased to -0.89% and -0.74%, respectively. From 2010 to 2014, the profitability ratios were characterised by a consistent trend. Such a trend paves the way for the efficient management of these entities.

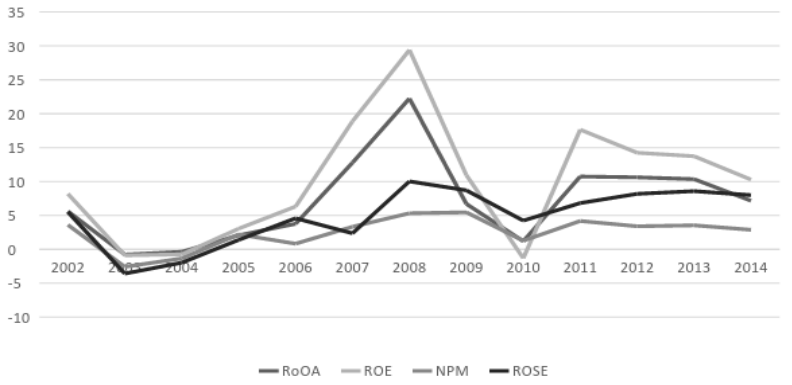

Fig. 1. Profitability of the healthcare sector

Source: own study based on Appendix – Tab. 1.

The analysis of liquidity was carried out based on the values of the current, quick and cash ratios in the years 2002–2014 (Fig. 2). The assessment of these ratios indicates an upward trend of these values; even though the values of all the ratios began to fall in 2014. Analysing the values of liquidity ratios, it should be noted that the healthcare sector is characterised by high values compared to the values of the same ratios in the manufacturing sector. First, the average values of cash liquidity exceed the standards calculated for manufacturing companies. This means that the healthcare sector is characterised by high levels of cash; whilst a small difference between the values of the current and the quick ratios (graph lines of QR and CR nearly overlap) informs that despite the specific nature of this sector, in which it would seem that a high level of inventory is necessary for the proper functioning of health care entities, these entities maintain low inventory levels. The high value of liquidity ratios is certainly safer for these entities, which is extremely important from the point of view of clients-patients.

The analysis of the ratios of short-term liabilities, short-term receivables, and inventory turnover in the years 2002–2014 shows that their values varied considerably. The analysis of the liability ratios revealed that the turnover of receivables in the healthcare sector amounts to no more than 30 days, which means that the collection period for deferred payments is very good. The period for the payment of liabilities is shorter than the collection period, which reflects very good liquidity of the healthcare sector as it can pay its liabilities quicker than it gets receivables. The average period of liabilities payment is up to 30 days. The healthcare sector is also characterised by a low level of inventory holding because, in the period under analysis, it is less than 10 days and only in 2002 it amounts to 16 days. The low ratios of short-term receivables, liabilities, and inventory turnover indicate the high efficiency of current assets and a positive cash flow.

The debt analysis shown in Fig. 3, based on the debt ratio (liabilities to total assets), indicates an upward trend of the analysed value. This means that in the studied healthcare sector, the debt level in the years 2008–2014 increased and on average amounted to 40%. Given the average value of the debt ratio, it can be stated that its value is not high, and, thus, it is not dangerous for this sector. The value of the ratio > 50% indicates a high level of debt and an increased financial risk for the healthcare sector. However, within the sector, there are entities whose debt level amounts to almost 100%, which is indicated by the maximum value of the ratio close to 99%. There are also medical institutions whose debt level is zero. Nevertheless, considering the average values of profitability and liquidity ratios, the analysed debt level provides a financially stable and efficient functioning of the healthcare sector.

Conclusions

The thesis formulated in the article stated that financial ratios used to evaluate enterprises could also be applied to the evaluation of medical institutions. The standards adopted for financial indicators in the manufacturing sector do not apply to the interpretation of financial ratios calculated for the medical entities. This has been confirmed by the analysis of the data derived from the standard financial ratios.

The analysis of the financial ratios calculated for the collected data of the healthcare sector has shown that:

- the ratios take correct values that can be interpreted,
- the ratios allow determining mean values acceptable as standard values,
- measuring and assessing the data from the healthcare sector offers an opportunity for correct management of such entities.

Jacobs, Smith and Street (2013) also indicate that healthcare markets are not fully competitive; there-

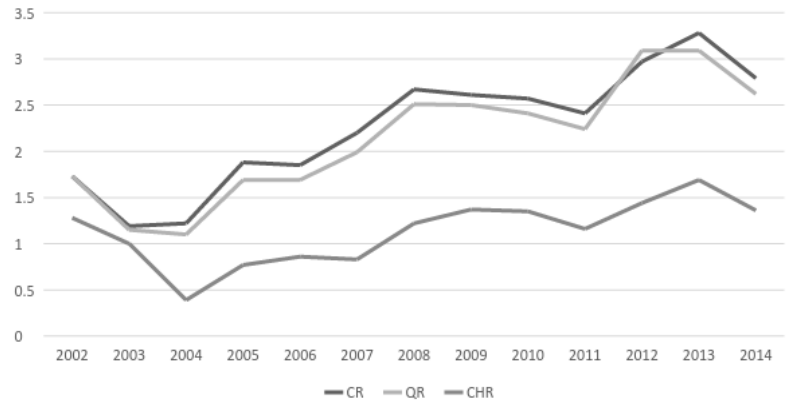

Fig. 2. Ratios of short-term receivables, short-term liabilities, and inventory turnover of the healthcare sector

Source: own study based on Appendix – Tab. 2.

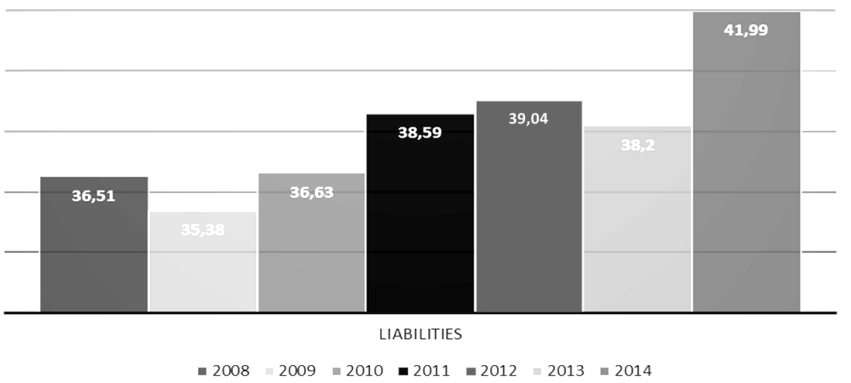

Fig. 3. Liabilities of the healthcare sector

Source: own study based on Appendix – Tab. 3.

fore, all the systems need some regulators. The most obvious need to introduce a regulator occurs when a large share of medical services is provided by the sector working for profit. In a situation where the system is dominated by public providers, the regulatory function may be performed by the government to exercise the supervision over the healthcare sector. Effective regulation plays an important role in promoting public safety. In addition, it requires measures allowing to evaluate the level of functioning of providers and to make comparisons.

According to Chluska (2014), the analysis of financial statements of health care entities poses significant problems both due to its procedures and determining and interpreting opinions based on this analysis. The specificity of the research environment of medical entities is influenced by factors such as:

- financial difficulties of health care entities resulting from limited resources of the sector that are a threat for ensuring the continuity of operations,
- using public funds to operate; hence, particular importance is attached to the rational financial management of medical entities and discipline of public finances,
- numerous restructuring processes,
- health benefits as an example of a specific product of an operating activity.

The changes in the Act on Health Services deprived health care entities of the non-profit status, where a negative financial result was not the reason for liquidation. Currently, medical institutions experiencing financial difficulties and incurring losses may be forced to transform or liquidate. Despite the independence in the management of health care entities, a forming entity's inability to cover losses and make a decision about the transformation or liquidation may result in a situation where liabilities of such an entity would burden the budget of the forming entity itself. Therefore, according to Wawrowski (2014b, p. 101), from the point of view of the supervisory function, it is important that owners of health care entities constantly monitor the financial standing and results of their units.

The article should be used as the reference base for analysing the financial configuration of medical entities because it contains a set of indicators and sources of information needed to make the right kind of analysis. An indicative analysis should be completed at each stage of the study for analysis of dynamics and structure. Most importantly, when evaluating the effectiveness of health care providers, it is important to assess changes in time and the structure of costs and revenues (Mioduchowska-Jaroszewicz & Romanowska, 2016). The viability of

the healthcare system depends on the financial soundness.

The capability of surviving in the market of the hospitals represent the basis of the system. Competent and robust financial management of hospitals is necessary. Financial ratios are crucial for the financial health of hospitals, relationships among the financial data of the economic units (including hospitals). Ratio analysis emphasises the need for achieving efficiency (internally) and effectiveness (externally) in operation dimensions which determine the competitive advantage that results in the return on equity above the average for the specific level of risk. The latter is affected by the capital structure and the liquidity conditions on the one hand (the financial point of view) and the investment in fixed assets (for the operational side of risk) on the other (Curtis & Roupas, 2009, pp. 209-210).

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Appendix

Tab. 1. Return on Operating Assets, Return on Equity, Net Profit Margin and Economic Return on Sales of the health care sector in Poland in the years 2002-2014

Return on Operating Assets

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	5.61	-0.77	-0.37	2.07	3.76	12.78	22.25	6.70	1.19	10.74	10.62	10.35	7.16
Standard deviation	6.38	2.34	1.95	3.84	13.20	19.62	25.30	15.39	15.58	21.00	15.96	16.27	13.73
Median	4.56	-0.42	-0.07	1.22	0.98	8.11	15.59	3.89	1.19	6.34	7.83	7.49	4.61
Max. value	23.73	5.19	4.59	14.77	46.95	79.85	124.94	55.65	22.48	77.73	67.36	67.26	55.36
Min. value	-12.25	-7.09	-5.17	-10.20	-32.26	-46.46	-51.25	-40.53	-42.21	-48.14	-45.79	-42.62	-41.38

Return on Equity

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	8.19	-0.89	-0.74	3.05	6.31	18.89	29.40	10.94	-1.31	17.65	14.24	13.73	10.28
Standard deviation	9.48	3.91	3.25	6.11	19.42	29.25	36.58	22.30	28.87	45.73	24.72	23.56	21.13
Median	6.45	-0.51	-0.1	1.65	2.06	13.69	23.00	5.64	1.55	9.41	10.41	9.82	6.56
Max. value	34.83	9.94	7.92	24.27	68.54	127.15	188.48	82.35	59.38	160.42	97.73	92.16	80.39
Min. value	-17.73	-10.93	-9.74	-12.00	-42.38	-80.00	-113.8	-58.14	-65.01	-121.3	-15.40	-67.12	-58.32

Net Profit Margin

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	3.61	-2.58	-1.34	2.20	0.83	3.33	5.32	5.46	1.27	4.18	3.40	3.54	2.88
Standard deviation	4.04	6.58	6.2	5.76	6.95	5.88	6.86	8.48	3.93	8.94	5.71	6.23	5.67
Median	2.54	-1.85	-0.37	1.84	0.92	2.65	4.50	3.36	1.50	2.19	2.29	2.42	1.62
Max. value	15.28	11.56	13.37	20.03	32.85	24.71	31.24	32.57	8.37	32.50	24.20	25.53	22.84
Min. value	-7.45	-21.65	-19.15	-17.18	-31.69	-17.84	-21.30	-24.57	-6.94	-28.49	-15.40	-18.44	-16.92

Economic Return on Sales

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	5.51	-3.58	-1.97	1.39	4.58	2.36	10.02	8.70	4.23	6.82	8.18	8.58	7.99
Standard deviation	6.05	7.3	6.50	9.41	6.91	8.02	8.65	9.97	13.83	11.88	8.48	9.50	8.74
Median	4.43	-3.9	-1.42	1.88	4.37	2.09	8.44	5.84	3.66	5.70	6.87	6.36	6.04
Max. value	22.45	15.59	12.83	33.44	25.70	31.03	45.04	41.07	40.83	43.53	40.81	44.99	41.72
Min. value	-11.05	-23.82	-20.80	-30.57	-18.37	-26.10	-22.94	-32.74	-31.45	-36.10	-18.75	-26.47	-25.92

Source: own elaboration based on (Dudycz & Skoczylas, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016).

Tab. 2. Liquidity ratios of the health care sector in Poland in the years 2002-2014

Current Ratio

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	1.73	1.19	1,22	1.88	1.85	2.20	2.67	2.73	2.36	2.60	2.97	3.28	2.79
Standard deviation	0.96	7.49	0,88	1.51	1.55	1.64	2.20	2.67	2.13	2.22	2.68	2.94	2.55
Median	1.58	1.43	1,10	1.42	1.35	1.66	2.04	1.91	1.41	2.04	2.10	2.39	1.97
Max. value	4.89	16.23	3,87	7.49	7.08	8.44	11.65	12.80	9.51	11.48	14.19	15.90	13.18
Min. value	0.19	-19.16	0,07	0.12	0.12	0.00	0.03	0.11	0.64	0.04	0.05	0.03	0.00

Quick ratio

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	1.73	1.15	1.22	1.88	1.69	2.20	2.51	2.56	2.65	2.25	2.81	3.09	2.62
Standard deviation	0.96	0.78	0.88	1.51	1.49	1.64	2.18	2.59	2.87	2.05	2.62	2.86	2.48
Median	1.58	1.05	1.10	1.42	1.16	1.66	1.89	1.76	1.40	1.84	1.97	2.28	1.85
Max. value	4.89	3.75	3.87	7.49	6.72	8.44	11.34	12.71	10.54	9.94	13.92	15.33	12.69
Min. value	0.19	0.15	0.07	0.12	0.06	0.00	0.03	0.11	0.05	0.04	0.01	0.03	0.00

Cash ratio

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	1.28	1.0	1.10	0.77	0.86	1.99	1.22	1.88	1.36	1.19	1.44	1.69	1.36
Standard deviation	0.90	0.72	0.82	0.96	1.09	1.50	1.40	2.10	2.05	1.61	1.79	2.09	1.68
Median	1.10	0.88	0.96	0.40	0.41	1.51	0.72	1.29	0.82	0.71	0.80	0.96	0.81
Max. value	4.25	3.47	3.47	4.34	6.72	7.16	6.98	10.21	8.60	7.67	8.37	10.17	8.10
Min. value	0.06	0.12	0.03	0.00	0.06	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00

Receivables Collection period

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	26.13	31.62	34.57	25.00	34.08	26.71	29.16	15.58	24.43	48.96	27.88	28.64	30.10
Standard deviation	19.52	12.04	9.64	21.06	13.10	14.62	11.09	19.97	22.22	36.10	10.09	11.85	12.96
Median	24.28	31.73	35.28	19.76	36.38	29.53	30.57	7.43	15.85	39.98	29.36	29.84	30.86
Max. value	84.35	59.56	56.64	102.87	82.07	86.36	63.21	88.04	79.23	179.53	56.50	65.76	72.80
Min. value	0.02	1.82	10.67	0.70	0.01	0.00	0.33	0.02	0.02	1.66	0.59	0.02	0.02

Liabilities Payment period

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	20.25	25.67	30.28	6.55	26.51	16.37	4.06	10.90	15.57	27.27	15.34	15.16	16.92
Standard deviation	16.69	13.85	19.95	5.88	21.58	14.57	3.97	9.02	14.55	27.34	11.52	11.53	12.57
Median	17.58	27.30	27.40	5.58	19.16	12.46	2.95	9.44	9.29	19.77	13.21	13.31	14.38
Max. value	70.02	67.65	88.48	32.58	109.70	70.98	19.71	50.57	46.10	129.61	61.27	65.03	69.64
Min. value	0.04	1.14	1.25	0.06	0.77	0.00	0.00	0.13	1.04	0.10	0.02	0.01	0.22

Inventory turnover

Items	Years												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Arithmetic mean	15.47	7.57	7.41	6.55	6.61	3.16	4.06	3.82	4.41	3.86	2.24	3.34	4.28
Standard deviation	13.34	5.01	4.68	5.88	5.30	4.32	3.97	3.60	4.11	3.90	2.62	3.38	4.08
Median	12.81	7.02	6.91	5.58	5.72	1.42	2.95	2.81	3.43	2.95	1.31	2.42	3.31
Max. value	56.52	21.02	21.41	32.58	30.65	21.55	19.71	19.27	20.93	20.23	13.37	17.65	22.18
Min. value	0.03	21.02	0.09	0.06	0.06	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00

Source: own elaboration based on (Dudycz et al., 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016).

Tab. 3. Debt ratios of the health care sector in Poland in the years 2002-2014

Equity to fixed assets ratio													
Items	Years												
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Arithmetic mean	15.47	7.57	7.41	6.55	6.61	3.16	1.90	1.59	2.02	3.81	2.24	2.32	1,63
Standard deviation	13.34	5.01	4.68	5.88	5.30	4.32	1.87	1.25	1.58	4.81	2.62	2.76	1,57
Median	12.81	7.02	6.91	5.58	5.72	1.42	1.28	1.21	1.25	2.35	1.31	1.35	1,18
Max. value	56.52	21.02	21.41	32.58	30.65	21.55	10.64	6.84	6.14	26.67	13.37	13.89	8,32
Min. value	0.03	0.08	0.09	0.06	0.06	0.00	0.06	0.00	0.00	0.01	0.01	0.00	0,01

Sustainability of financing													
Items	Years												
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Arithmetic mean	2.18	0.95	0.93	1.14	1.08	1.45	0.73	0.74	0.63	0.64	0.74	0.75	0.76
Standard deviation	1.91	0.38	0.39	0.62	0.54	1.10	0.19	0.23	0.26	0.27	0.19	0.20	0.23
Median	1.76	0.97	0.69	1.05	1.05	1.13	0.78	0.81	0.73	0.69	0.79	0.81	0.82
Max. value	9.12	1.96	1.96	3.66	3.11	5.76	1.12	1.00	0.95	1.00	1.07	1.00	1.00
Min. value	0.05	-0.03	0.02	0.04	0.11	0.00	0.03	0.03	0.15	0.02	0.03	0.02	0.02

Total debt													
Items	Years												
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Arithmetic mean	0.60	0.65	0.68	0.71	0.74	0.73	36.51	31.82	47.52	43.71	39.04	38.20	31.79
Standard deviation	0.23	0.24	0.21	0.62	0.17	0.19	21.79	24.39	29.54	27.90	24.39	24.80	25.24
Median	0.62	0.71	0.73	1.05	0.79	0.77	32.77	26.79	36.22	38.88	35.68	34.93	24.95
Max. value	1.00	0.99	0.98	3.66	0.99	1.00	97.25	99.80	99.95	99.44	99.76	99.79	99.78
Min. value	0.05	-0.03	0.08	0.04	0.17	0.03	-3.23	0.13	6.54	0.02	0.24	0.00	0.00

Source: own elaboration based on (Dudycz & Skoczylas, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016).

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ISMSME International Society for Manufacturing, Service and Management Engineering

received: 5 July 2016
accepted: 28 January 2017

pages: 57-63

Efficiency of public and nonpublic primary health care providers in Poland

Anna Lachowska

ABSTRACT

The main aim of the paper is to reveal the outcomes of a research based on the efficiency of primary health care providers. The scientific goal of the mentioned research was the development of an efficiency measurement model and verification of its usefulness in practice. Overall, the research found that it is possible to use the efficiency measurement model for health care providers. Besides, significant differences were discovered in the efficiency of public and nonpublic primary health care providers. The research was conducted in the West Pomeranian Voivodship in Poland. This paper contributes to the widespread debate on public and nonpublic ownership in the field of healthcare. Also, it has practical implications as the research findings may be useful for any healthcare sector stakeholder, from decision makers to patients. The research was based on the literature overview, which allowed to elaborate the efficiency measurement model. The empirical research (based on a form of questionnaires) allowed testing the proposed model. The described efforts allowed drawing conclusions on the efficiency of primary health care institutions in the West Pomeranian Voivodship. The following methods of data analysis are presented in the paper: synthetic measure of development (SMD), Ward's method, and k-means method. According to the main conclusion of the research, it is possible to measure the efficiency of public and nonpublic health care providers of the Polish healthcare system. The proposed model for measuring the socioeconomic efficiency may be used as one of the tools used to measure the efficiency in the primary care. The verification of the usefulness of the model showed that nonpublic health care providers operating in the field of the public sector, outperformed public providers. The paper contributes to the theoretical field as it reveals a comprehensive approach to the efficiency measurement in the health care sector. The efficiency measurement model is based on the three major pillars of the healthcare sector, namely, income/resources, cost, and the social aspect. The elaborated efficiency measurement model for the healthcare sector was implemented and tested on a group of primary health care providers in the West Pomeranian Voivodship. The research allowed for positive conclusions regarding its usefulness in practice.

KEY WORDS
public, nonpublic, healthcare providers, efficiency

DOI: 10.1515/emj-2017-0014

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Introduction

One of the key areas of the state protectionism in Poland is the healthcare. It is reflected in the Polish Constitution, which guarantees citizens equal access to health care services. However, in order to improve the efficiency of use of limited public funds, some market mechanism have been implemented.

In Poland, the first significant regulation imposed on the supply side of the market of medical services was the act on health care institutions of 1991 (Ustawa..., 1991). An important provision of the mentioned act was the implementation of public providers' independence and the introduction of the possibility for nonpublic entities to provide medical services in the public system.

The growing debt of public health care providers, difficulties in the access to health services and the growing dissatisfaction of patients, indicate the need for restructuring of the Polish healthcare system. One of the most important issues is the improvement of the efficiency of public health care institutions by changing their legal structure. As perceived by the author, the need for research efforts in this area was justified by the lack of comparative studies on the economic and social efficiencies of the functioning of public and private providers in the publicly financed system.

1. Literature review

Healthcare efficiency is a complex issue. On the one hand, the issue of the economic and social efficiencies should be defined separately. It is a common perception that the economic efficiency and the social efficiency remain antagonistic to each other. This is because the fulfilment of economic demands often precludes the fulfilment of social demands and vice versa. On the other hand, the characteristics of goods and services in the healthcare sector, as well as their importance, do not allow for the isolation of the economic and social efficiencies (Lachowska, 2014, p. 108). The healthcare system is a specific case, in which economic and social efficiencies are strongly interdependent (Stiglitz, 2004, p. 112). This translates into some disharmony of the existing healthcare systems (Lachowska, 2014, p. 108). The problem of the efficiency analysis lies in the field of the interest of whole organisations like WHO (WHO, 2000) or OECD (OECD, 2010) as well as many domestic and foreign researchers. Referring to the Polish praxeology, efficiency issues were considered by Kotarbiński (Kotrabiński, 1999, p. 324), Zieleniewski (Zieleniewski, 1969, p. 232), and Kieżun (Kieżun, 1978, p. 7). The efficiency analysis was studied by many foreign scholars, including Pareto (Morris et al., 2012, pp. 246-255), Koopmans (Koopmans, 1951, pp. 455-465), Debreu (Debreu, 1951, pp. 273-292), Leibenstein (Leibenstein, 1966, pp. 392-415), Farrel (Farrel, 1957, pp. 253-290), and Charnes, Cooper and Rhodes (Charnes, Cooper & Rhodes, 1978, pp. 429-444) who developed the field of production efficiency. Based on their findings, different efficiency analysis tools were developed, such as parametric (stochastic frontier analysis SFA) and nonparametric (data envelopment analysis DEA) methods. The mentioned efficiency analysis methods are applicable in the field of healthcare (Jacobs et al., 2006), although they have their constraints, e.g. omitting social issues. Referring to the query on the efficiency literature by Hollingsworth, the most popular is the DEA method, which is used by most hospitals (Hollingsworth, 2003, pp. 203-218). In the economic analysis of health care efficiency, different cost-related methods are proposed to be used, such as the cost–benefit analysis, cost–utility analysis or cost–efficiency analysis (Folland et al., 2013, pp. 63-84). However, due to the difficulties in the value of human life and health assessment, the more useful is the cost–efficiency analysis (Garber & Phelps, 1997, pp. 1-31).

So far, there has been no complex research showing the kind of efficiency methods commonly used in the Polish healthcare system; however, it might be assumed that the most popular are indicator methods, due to their usefulness and easiness of application. It may refer especially to smaller primary care providers. Domestic studies on the efficiency of health care institutions haven't focused so far on the distinction between the efficiency of public and non-public providers, which is a significant research gap.

2. Research methods

The literature overview has allowed elaborating the model for measuring the socioeconomic efficiency of health care institutions, which was tested during empirical studies. The mentioned model (Tab. 1) measures the efficiency in the three pillars of

Tab. 1. Model of measuring the economic and social efficiency of health care providers

Three - pillars of the efficiency measurement system		
Pillar I Income/Resources	**Pillar II Costs**	**Pillar III Social aspect**
Area of analysis: the level of system's resource absorption	Area of analysis: the real cost of services	Area of analysis: the ability to sustain and improving health

Source: created by the author (Lachowska, 2014, p. 122).

the healthcare system, according to designed efficiency indicators (Lachowska, 2014).

According to the model, the designed indicators were grouped into three groups referring to each pillar:

- income/resources pillar (the ratio of income to the number of cured patients — Z1, the ratio of income to the number of employees — Z2, the ratio of income to the amount of provided services — Z3, and the ratio of income to the average monthly size of patient population — Z4),
- cost pillar (the ratio of total costs to the number of cured patients — K, the ratio of total costs to the number of employees — K2, the ratio of total costs to the amount of provided services — K3, and the total costs to income ratio — K4),
- social pillar (the ratio of provided services to the number of cured patients — S1, the ratio of patients that quit the institution to the average monthly size of patient population — S2, the ratio of total costs of diagnostic tests for patients to the total income – S3, and the ratio of the number of cured patients to the number of employees — S4).

The main criterion of the study was the form of ownership. The study involved providers with a public and nonpublic form of ownership. Additionally, the following criteria were taken into consideration:

- the type of activity — primary health care,
- a contract within the same branch of the National Health Fund.

The research involved the following stages:

- Stage 1: Literature overview, referring to the health care efficiency. Defining the efficiency and methods of its measurement;
- Stage 2: Primary research — collecting data from health care providers;
- Stage 3: Systematisation, control and processing of the research data;
- Stage 4: Analysis of efficiency indicators related to the proposed efficiency measurement model;
- Stage 5: Synthesis — drawing conclusions on the basis of the literature overview and empirical studies.

The research material was collected on the basis of a full survey conducted among the providers that meet the research criteria listed above. Respondents were asked to fill in the data questionnaire. The mentioned data were used to calculate the efficiency indicators according to the proposed model. Finally, the study involved 31 out of 297 primary health care providers operating under a contract with the National Health Fund in the West Pomeranian Voivodship. The group of public providers consists of eight entities, and the group of nonpublic providers has 23 entities. The calculated indicators were used to assess the efficiency of public and nonpublic providers according to the elaborated efficiency measurement model in the indicated three pillars of the health care system. As it was already mentioned, the article shows taxonomic methods of data analysis. The study covered the period 2009-2010, allowing for the verification of the usefulness of the model.

3. Research results

The analysis of the study results was made on the basis of several carefully selected statistical methods, which allowed drawing comprehensive conclusions of the research. The gathered data were also interpreted on the basis of taxonomic analysis methods. This analysis is used in a hierarchy of objects described in the multidimensional space of features, from the point of view of certain characteristics, in the case where it is impossible to measure it directly. The author selected the following methods: synthetic measure of development (SMD), Ward's method, and k-means method.

The application of the first synthetic measure of development (SMD) showed that in terms of the used efficiency indicators, public health care providers were classified as the worst (Fig. 1 and 2) both in 2009 and 2010. As normalised synthetic measure of development ranges from 0 to 1, where the highest value indicates higher efficiency according to the proposed efficiency indicators.

Normalised value of the synthetic measure of development for the highest classified nonpublic health care provider was 0.6447 in 2009 and 0.6309 in 2010. For the highest quoted public health care provider in 2009, the SMD value was 0.0759 and amounted to 0.0663 a year later.

In 2009, the average value of the indicator for nonpublic providers was 0.35 and in the case of public institutions — 0.03. In 2010, the average value of the indicator for nonpublic establishments decreased to 0.32, and in the case of public providers, remained at 0.03. A higher value of the normalised SMD indicates a higher the level of provider's efficiency referring to the proposed efficiency indicators. It is worth noticing that nonpublic providers have shown a significantly higher efficiency.

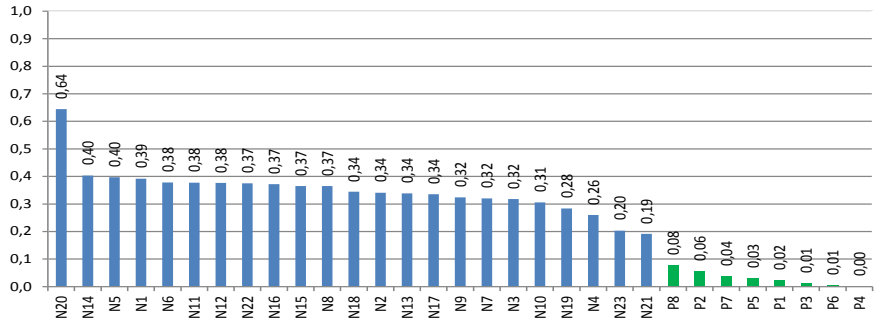

Fig. 1. Prioritising public and private health care institutions in terms of effectiveness in 2009, using SMD (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 168).

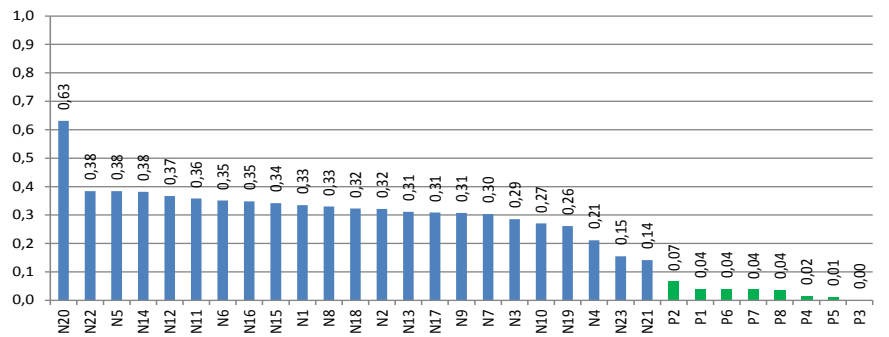

Fig. 2. Prioritising public and private health care institutions in terms of effectiveness in 2010, using SMD (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 168).

The average value of normalised SMD shows that measured by the proposed indicators in the research period, public health care providers showed the efficiency, which was more than ten times lower than that of nonpublic providers. The application of this method raises, therefore, an issue regarding the legitimacy of its use for a particular selection of indicators to measure the efficiency. The reflected differences in the efficiency of the test subjects should be verified using other statistical methods. For this purpose, the Ward method in combination with the k-means method may be used.

The implementation of the Ward method showed three

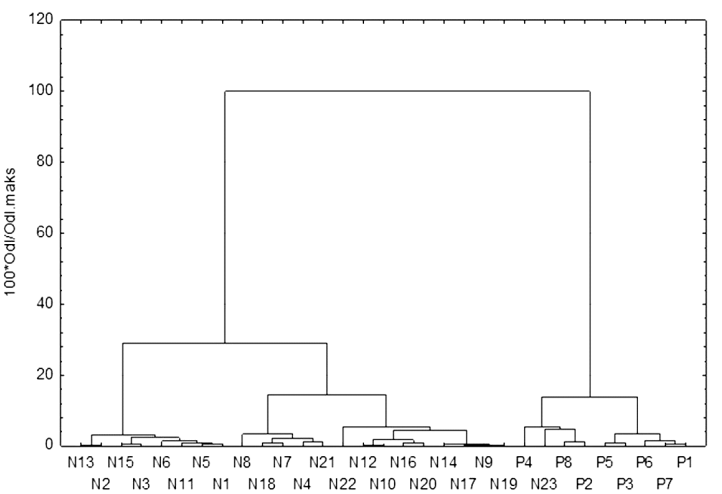

Fig. 3. Ward's dendrogram of health care providers in 2009 (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 169).

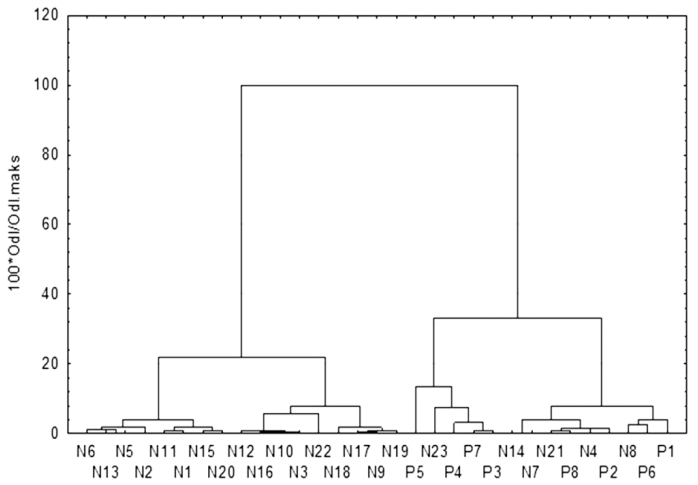

Fig. 4. Ward's dendrogram of health care providers in 2010 (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 170).

groups of providers characterised by a similar level of efficiency. The tree diagram (Fig. 3) shows that in 2009, almost all of the examined public providers massed into a separate group, characterised by a similar level of efficiency referring to the proposed indicators.

In 2010, the distinction between public and non-public providers was not as sharp as the year before (Fig. 4).

Grouping of healthcare providers with the help of the k-means method has confirmed that in terms of the efficiency in 2009, public health care providers constituted a separate group of surveyed entities. Fig. 5 shows the grouping of the providers with a similar level of efficiency.

The examination of the average values of the indicators of individual groups of providers showed that in 2009, one group of public entities had the least favourable arrangement of these indicators (Group 3). In this group, there was also one nonpublic provider. Group 1 had the most favourable arrangement of the indicators and consisted of exclusively nonpublic providers. The average rates for groups of a similar level of efficiency in 2009 are shown in Tab. 2.

In 2010, this division was not as sharp because public providers were scattered in two groups (Fig. 6). The examination of the average values of the indicators in each of the newly formed groups showed that some public institutions, assigned to the most vulnerable groups in terms of efficiency indicators in 2009, appears in the group of providers characterised by a higher level of efficiency (Tab. 3).

It can be assumed that improving the efficiency of public health care in 2010 was the result of the new

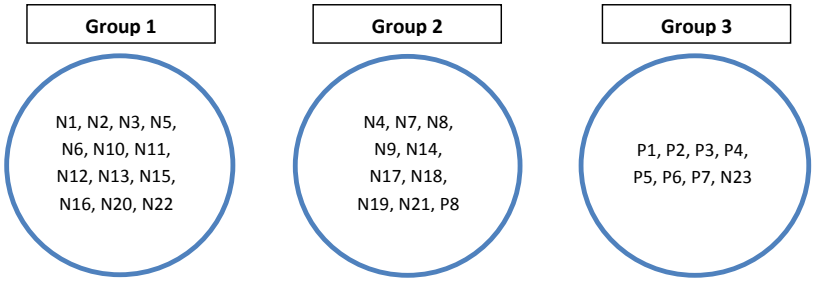

Fig. 5. Group of entities with a similar level of efficiency in 2009 (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 170).

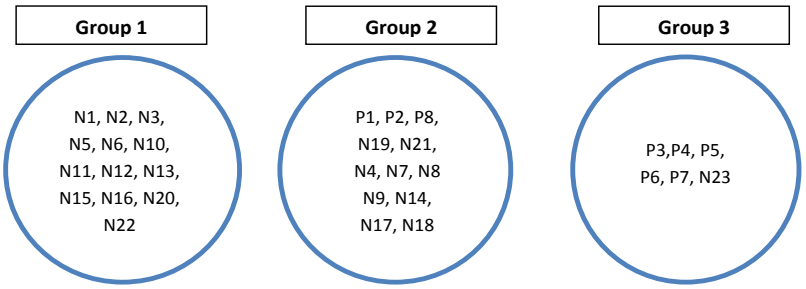

Fig. 6. Group of entities with a similar level of efficiency in 2010 (where public providers are marked as "Pi", i = 1-8, while nonpublic providers as "Nj", j = 1-23)

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 172).

Tab. 2. Average rates for groups of providers of a similar level of efficiency in 2009

Indicators	Unit of measure	Average for indicator		
		Group 1	Group 2	Group 3
Z1	(PLN/person)	53.56	66.04	140.9
Z2	(PLN/employee)	85116.90	102829.60	122996.2
Z3	(PLN/service)	25.83	34.29	67.8
Z4	(PLN/person)	4.93	5.05	5.4
K1	(PLN/person)	37.41	47.23	127.1
K2	(PLN/employee)	59819.63	75044.27	109028.6
K3	(PLN/service)	17.85	24.57	61.0
K4	(percent)	70.45	71.29	88.9
S1	(PLN/service)	2.11	1.92	2.1
S2	(percent)	0.86	1.20	3.4
S3	(percent)	12.26	9.75	3.7
S4	(person/employee)	1748.92	1728.51	959.9

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 171).

Tab. 3. Average rates for groups of providers of a similar level of efficiency in 2010

Indicators	Unit of measure	Average for indicator		
		Group 1	Group 2	Group 3
Z1	(PLN/person)	52.84	80.5	123.33
Z2	(PLN/employee)	85097.50	104985.2	124121.20
Z3	(PLN/service)	25.81	38.7	62.30
Z4	(PLN/person)	4.92	5.1	5.03
K1	(PLN/person)	37.70	62.0	114.65
K2	(PLN/employee)	61101.30	79787.3	112723.00
K3	(PLN/service)	18.42	29.8	57.52
K4	(percent)	71.99	75.3	91.06
S1	(PLN/service)	2.07	2.0	1.95
S2	(percent)	0.90	1.6	2.72
S3	(percent)	12.62	8.6	4.16
S4	(person/employee)	1726.25	1524.7	1128.39

Source: author's elaboration on the basis of own research (Lachowska, 2014, p. 172).

law that introduced the obligation to pay out the debt of public institutions by its founding body. This likely contributed to the increased control over the activities of public institutions, which could have led to the improvement of their efficiency.

In summary, the carried out analysis using the Ward's and k-means methods showed that there was a clear distinction between public and private health care providers in terms of the efficiency in 2009. In the study period 2009-2010, there were no public

providers in the first group that had the most advantageous arrangement of indicators in both years.

4. Discussion of the results

The presented research has its practical and theoretical implications. The literature overview allows making conclusions regarding the Polish healthcare system, one of which indicates that the system is not working properly. One of the most significant causes of the existing situation is a defective legal solution in the field of public health care providers. Poland still has insufficient research on the efficiency of public and nonpublic providers operating on the basis of public funds. It translates into certain analytical and decisive frailty of the healthcare system authorities. Foreign studies do not suggest conclusions in this respect. However, it is possible to measure the efficiency of health care providers in Poland using appropriately constructed and adapted measurement tools, such as the presented model of economic and social efficiencies of health care institutions. The conducted research has shown that in the period 2009-2010, nonpublic providers operating in the public field in the West Pomeranian Voivodship were far more efficient than public providers. The majority of public entities have noticed a worse efficiency level according to the model proposed for the measurement of economic and social efficiencies (using a different taxonomic method of analysis). Taking into consideration the size of the surveyed population and the research period, conclusions on the entire Polish population are constrained. However, the verification of the usefulness of the model allows implementing it into the practice, which enables the continuation of the research in the future. It should also be mentioned that the defective legal system is one of the factors influencing on the efficiency of health care providers. The problem the efficiency of public and nonpublic provider is more complex and requires further research and analysis of the differences in the public and nonpublic parts of the healthcare sector.

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 1 October 2016
accepted: 20 April 2017

pages: 64-72

Are there just barriers? Institutional perspective on the development of e-health in Poland

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ABSTRACT

Development of e-health in Poland has suffered from multiple setbacks and delays. This paper presents views on and experiences with implementation of e-health solutions of three groups of respondents: buyers, suppliers and external experts with the aim of establishing to what extent and in what way e-health development was taking place in Polish public health care and if there were any national policy targets or European targets influencing this development. It is based on desktop studies and interviews conducted in Poland in the spring and summer of 2015. The interviews largely confirmed findings from the desktop study: legal obstacles were the decisive factor hindering the development of e-health, especially telemedicine, with extensive insufficiency of basic IT infrastructure closely following. Stakeholders were deterred from engaging with telemedicine, and from procuring e-health using non-standard procedures, from fear of legal liability. Some doctor's resistance to e-health was also noted. There are reasons for optimism. Amendment to the Act on the System of Information in Health Care removed most legal obstacles to e-health. The Polish national payer (NFZ) has started introducing reimbursement for remote services, though it is still too early see results of these changes. Some doctors' reluctance to telemedicine may change due to demographic changes in this professional group, younger generations may regard ICT-based solutions as a norm. In the same time, poor development of basic IT infrastructure in Polish hospitals is likely to persist, unless a national programme of e-health development is implemented (with funds secured) and contracting e-health services by NFZ is introduced on a larger scale.

KEY WORDS

barriers, eHealth, Poland, telemedicine

DOI: 10.1515/emj-2017-0015

Introduction

This article derives from desktop study research and interviews carried out in the initial phase of the project: European Procurers Platform — eHealth — Transforming the market for eHealth Solutions. The goal of the project was to investigate and compare current developments in e-health in selected member states (Denmark, Poland and Spain) with a focus on barriers, opportunities and case studies. The aim of this paper is to establish to what extent and in what way e-health development was taking place in Polish public health care and if there were any national policy targets or European targets influencing this development.

ICT solutions have been playing an increasingly prominent role in how health care systems deliver

services and how they organise their internal work (Iakovidis, Wilson & Healy, 2004). E-health has been promoted by the European Commission (EC) (2013, 2014), because of its assumed potential for alleviating some of the public health problems that the European Union (EU) struggles with: growing burden of chronic and civilisation diseases, ageing. All of them are associated with rising costs of treatment and care, and shortages of the medical staff, and which the EC hopes to reduce with the help of the technology (Bell & Thornton, 2011; Kumar & Bauer, 2011). The value of the global e-health market was estimated at $2.2 billion in 2015, and its projected growth to $6.5 billion by 2020 by some sources (MarketsandMarkets, 2015), or even to €17.6 billion by 2017 by others (European Commission, 2015).

The term e-health (e-zdrowie in Polish) is widely used in official documents such as legal acts, bills or reports. However, its definition is nowhere to be found as far as Polish sources are concerned, and definitions used in European Commission's communicates are presumed. Judging from the national documents on the subject (Ministerstwo Rozwoju Regionalnego, 2012; Ministerstwo Zdrowia, 2009), policy makers connect it mainly to medical information systems (registration, databases and so on), giving little attention to clinical services delivery with the help of ICT. While the European Commission considers telemedicine a subcategory of e-health, in Poland it is usually understood to be a separate category. Consequently, services such as telecare, teleconsultation, telemonitoring are classified under telemedicine, while e-prescriptions and e-referrals fall under e-health (European Commission, 2004). To avoid the confusion, in this article we will use the broad understanding of e-health that includes using information and communications technology (ICT) in health care (eHealth Policy).

1. Research method

The desktop research was conducted from February to May 2015. It involved a literature review and a secondary analysis of documents relevant to the topic. It was aimed to identify Polish e-health policy targets and their relationship with European targets, definition of e-health used in national documents, national laws regulating e-health and national plans for its future development (including targets and strategies, authors and public authorities that support it and foreseen timeframes), key barriers and opportunities for its development. It was also set to assess the size of e-health market in Poland and provide successful and unsuccessful case studies of e-health implementation. From an institutional perspective, it included all Polish legal acts regarding e-health, Ministry of Health strategies for informatization and development of e-health, Supreme Audit Office reports on healthcare informatization and European Commission's e-health Actions Plans. This data was supplemented with scientific and lay articles regarding the topic of e-health. An emphasis was put on cross-checking opinions and facts to paint a complete and coherent picture of e-health development. This research stage served as a basis for the next one, a qualitative study, in which a series of structured interviews was carried out from June to September 2015. The interview questions were developed basing on the findings of desktop research and were designed to provide a deeper and more practical perspective on the e-health situation in Poland as well as to verify it against stakeholders' personal experience. With that in mind, the interview scenario included (but was not limited to) questions regarding subjective understanding of e-health, typical and innovative e-health solutions, motivations for its development, healthcare sectors that could benefit the most from it, social and political changes that influenced it in the past years as well as perception of its future. To comprehensively evaluate market perspective, the research included stakeholders representing buyers and suppliers as well as experts – people with considerable knowledge regarding e-health market in Poland but not directly involved in it. The sample was gathered through convenience sampling. There were 4 experts (including an academic professor, a journalist, an expert-consultant in one of the major Polish NGO and a member of a consultancy agency), 6 buyers (representatives of various Polish healthcare facilities) and 4 suppliers (including a deputy CEO's and three head of departments in Polish companies providing e-health solutions) from Poland interviewed. The conversations were conducted by the phone or Skype, recorded, and later transcribed. Interviews' transcripts were coded during the analysis stage of the research using Atlas.ti software. A code book was developed and used throughout the analysis process. It was initially prepared based on the desktop study as first codes were identified through deduction process basing on the findings from the literature review and secondary analysis. Subsequently, the codes were further refined through induction, following a the-

matic analysis (TA) of the interview transcripts, to comprise new themes that were previously uncovered. Eventually, the codebook consisted of 77 codes that were used to analyse the interviews. Once the transcripts were coded, the relationships between particular codes were identified and described. Firstly, analytical efforts focused on the semantic level of the material. Only reoccurring themes were subject to more interpretive, higher level, analysis. An essentialist approach was balanced by elements of constructionism (Braun & Clarke, 2006). The codes, their content corresponding with the coded quotations and their relationships between each other were then used to describe the findings of the research, presented in this article.

The findings of the desktop study provided a background, against which the information obtained from the interviews was compared. The desktop study results provided a context and helped saturate the interviews with meaning. The latter complemented the former, painting a multi-dimensional picture of mechanisms underlying public procurement of e-health, and various barriers encountered by stakeholders in the process. As previously mentioned, the EPP Project investigated four countries, but this article concentrates exclusively on Poland.

2. Research results of the literature search and the interviews[1]

The literature search and the interviews from all stakeholder groups showed multiple challenges to e-health implementation in Poland, with legal ones undoubtedly being invoked most often and presented as the decisive ones

2.1. Legal barriers

The legislation was the single barrier to procurement and implementation of e-health solutions mentioned by all of the interviewees regardless of stakeholder group they represented. The precarious legal status of telemedicine was most often cited as an example, with some of the interviewees (especially suppliers), admitting to waiting for the moment when they would be able to offer ICT-based services. For that to happen, legislation and policies they see as hindering the development of e-health would have to change.

Failure of the national payer to reimburse e-health services was quoted as another barrier to e-health development. Very few e-health services could be performed by health care units (like the remote interpretation of radiological imaging; see below) without being questioned by the NFZ. (E-health solutions for administration, for example, e-registration, electronic health records (EHR) are not regulated by the NFZ, but bring their own problems).

With telemedicine becoming legal at the end of 2015 (after the interviews were conducted), and with the NFZ having launched multiple telemedicine pilots (mainly in psychiatry, geriatrics and cardiology) (TVP.info, 2015), and moving towards routine contracts for telemedical services (NFZ, 2015; Król, 2015), there seem to be some reasons for optimism.

All the interviewees perceive the legal framework as a major barrier to e-health procurement and implementation. Buyers particularly feel frustrated by uncertainty. Deadlines for the introduction of the EHR systems had been postponed several times due to delays in e-health projects managed by a government agency set up especially for computerisation of the healthcare system (CSIOZ), but the framework should be functioning in 2017, so the hospitals must be prepared for it. Although the legal framework is now in place, compatible solutions and proper infrastructure are still lacking. One of the buyers complained that they had been prevented from launching e-consultation services they piloted because of the law in force at the time. Suppliers were also aware of the barriers created by the lack of appropriate legislation:

"As long as telemedicine services are not [recognised], no-one will be able to purchase them. They will buy them only as an attraction, something of a pilot." (Supplier 3)

One of the interviewees expressed fears resulting from the precarious legal status of this branch of e-health even more clearly, relating telemedicine directly to a danger of prosecution.

[1] The results of the study are shown in this paper in a slightly different way to the one that is commonly used. The authors decided to present both literature search and interviews in the same sections. This allows the literature search results to be checked against the opinions of the interviewees. As it can be seen in the paper, the interviewees agreed with what was found during the desktop research and provided some additional explanation or an angle to the mentioned results.

2.1.1. Barriers to remote consultations

The need to examine a patient in person remains important for physicians and, up until recently, an obligation to do so was written into the law: Professions of Physician and Dentist Act. The act was amended simultaneously with the Act on the System of Information in Health Care when the obligation was removed. Similarly, the legal requirement of a handwritten signature on a prescription hindered government's pilot e-prescription project (Ministerstwo Zdrowia, 2012). This requirement has been lifted only for chronically ill patients. The inadequate legislation was quoted as the main obstacle to e-health development by Adamski (2014) in a report for the European Commission, with substantial delays in central government's projects closely following.

2.1.2. Challenges related to data transfer and storing

Some stakeholders expressed frustration at the thought that they could not incorporate technologies that have redefined many other business sectors into their e-health solutions.

"[...] one barrier today are [...] regulations that practically make it impossible or hardly possible to use cloud-based solutions. [...] Because, correspondence, an exchange of views is going on between the Health Ministry and GIODO [Polish data protection agency]. On this topic exactly. It's like, I don't know if it makes sense to go into such details. It's not a problem with personal data protection, but rather with outdated regulations, that are included in this law, about the doctor and the pharmacist... [...] and there are such regulations that imply that generally everything that is exchanged between a doctor and a patient in the privacy of the physician's office, is for their information only, and this information can be shared in concrete, predetermined circumstances." (Supplier 1)

In theory, at least, the above-mentioned amendment of the Act on the System of Information in Health Care (Ustawa..., 2015) from November 2015 opened the door to innovation. It permitted electronic data storage and processing services to be outsourced by health care units. Moreover, it states that technical specialists responsible for the maintenance of an e-health system have a right to access EHRs, but are automatically bound by "professional secrecy".

In practice, however, in the traditional paper-based system that still dominates, patient's consent (signature) is regularly required for various treatment activities, including health data transfer. Moreover, the safety of the personal data of patients has been examined and called into question more often than ever. A national EHR has not been introduced in Poland yet (December 2016). There are functioning regional solutions (usually hospital patient records that are not shared between institutions), and basic e-health solutions like e-registration are quite common (Bartczak & Barańska, 2015; Karlińska, 2014). Protection measures currently used by some hospitals have been criticised by the press (Klinger & Janczura, 2016), as has inaction on the part of the Polish data protection agency, GIODO. Similarly, the pilot introduction of e-prescription was subjected to harsh critique due to the perceived failure of data protection measures (TOK FM/rynekaptek.pl, 2015). In Poland, unlike many other EU countries (EU Health Programme, 2014), patients own their medical data and have a right (so far prospective) to withhold any piece of information from medical specialists in the planned EHR. This arrangement was upheld by an amendment to the Act on the System of Information in Health Care (Ustawa..., 2015) that directly regulates e-health and telemedicine. (Hospital EHR systems do not have this functionality). No information regarding planned secondary uses (academic or commercial research, medical statistics) was found.

The government needs to perform a difficult balancing act between allowing the health care system to benefit from what e-health has to offer to ensure the safety of the citizens' most sensitive data.

What is more, exceptional (compared to other branches of e-health) development of teleradiology through increased use of remote services suggests that when the will and opportunity are there, e-health can develop. Radiology is unique in that the patient and the radiologist do not have to meet at all for most of the routine services (interpretation of imaging). Because of this, using the internet for communication between a hospital and a radiologist has not caused much controversy. An interviewee explained the mechanism:

"[...] However, teleradiological services still operate outside the law, right. [...] Not in accordance with the current law. There are some 'legal tricks' that they make use of, and that's why it works. Since a radiologist mainly describes radiograms or results of MRI or CT or imaging. Thanks to that, it is a bit easier of a task, since such pictures are easily sent by an IT network. [...] So, teleradiology has developed mainly because there's an ever-growing need for radiologists." (Buyer 1)

This case suggests that, on the one hand, services based on ICT can be achieved even in a seemingly unfriendly technological and legal environment. On the other hand, there is no reliable data on how patient information safety standards are enforced in such arrangements. This leaves the open the question of whether teleradiology "by the book" is actually possible in the current circumstances.

2.2. Fragmentation and resulting lack of interoperability

Interestingly, despite obvious delays and failures of the law-making in the area of e-health, some interviewees think that interoperability and other standards for e-health solutions should be set by the law:

"...if I were Health Minister, I would introduce something like that [guidelines for e-health solutions]. If we have sets of guidelines for financial and accounting system, you know. If we have a set of requirements that must be met by a payroll system, then why on Earth shouldn't there be a set of requirements that must be met by a medical system? Is it any worse? NO!" (Supplier 2)

2.3. Infrastructure

An often-mentioned barrier, especially by suppliers and those buyers who worked as hospital system administrators, was a lack of appropriate IT infrastructure, on which e-health solutions of any kind could run.

"What will be the use of software bought by a health care unit, if it doesn't have the equipment. [...] Clearly, this the biggest the biggest problem, I guess." (Buyer 2)

Yet, finding money to buy and maintain the said infrastructure proves difficult for underfunded hospitals, and is simply not a priority. In the absence of a coherent, long-term national financing policy for healthcare computerisation, let alone e-health, EU funds often prove to be a source of capital, on which the pace of ICT implementation in public hospitals depends (Karlińska, Masiarz & Mężyk, 2014). Indeed, buyers cite an opportunity for acquiring EU funds as an important motivation for starting an e-health project at a particular moment, and at a particular cost. This approach to decision-making may be interpreted as yet another symptom of a dramatic underdevelopment of IT infrastructure. The issue of basic infrastructure such as computers, servers, Internet connection was brought up repeatedly by all groups. It is quoted as the biggest obstacle (apart from the legal ones) to implementing even basic e-health solutions.

"I think we hadn't been aware of just how important hardware is. [...] In the first place, we got ourselves a computer network. Only then certain services could be launched, but then again, we realised it that at a certain stage it wasn't enough... I mean, simply [better] equipment was needed, and in 2013 we again applied for a European project. We got the money and could finance our equipment, and only then we were able to launch these larger services, I meant on a larger scale. But the hardware is a very important thing." (Supplier 2)

2.4. Procurement practices

Advanced technology can be notoriously hard to procure (European Commission, 2010), and it applies to ICT as well. IT evolves constantly, and updating it is a necessity in terms of data safety and preventing disruption in the functioning of any institution that heavily relies on its IT systems. Clearly, requirements that health care information systems are expected to meet are much higher. Procuring such solutions necessitates a more flexible and multi-faceted approach than procurers working in the health care system are accustomed to, which has an impact on e-health implementation.

In the experts' opinion, a fear of breaching the law, widespread among the procurers, played an important role in how e-health solutions are bought. Anxious about unwittingly breaking the law, procurers fail to reach for tender procedures that would allow them to address lifecycle costs and cost-efficiency, instead of simply the purchase price:

"For now, it [interest in using the new procurement procedures] is small. My observation shows that people who do that [run tenders], firstly try not to run the risk of breaking the law or getting into trouble with the Public Procurement Office, rather than use it to achieve the aim. [...] the people responsible for that try to stay away from risk (…) of, for example, using criteria other than price." (Expert 1)

The fact that the criterion of price (that is the purchase price) still dominates in tenders, being often the only criterion and almost always the deciding one, is another barrier to procuring functional, innovative, cost-efficient e-health solutions. One of the experts' views was that choice based on other criteria should be made obligatory:

"Perhaps, if certain things were regulated, then the tender procedure would better support innovations (...)." (Expert 2)

Another expert explains that procurers are forced by law to use criteria other than the purchase price, but still are afraid to do so, so other criteria remain a formality without actual influence on the outcome:

"Right now (...), people who do that [procurement], try to avoid liability related to, for example, including a second criterion besides price (...)." (Expert 1)

Generally speaking, regulations are perceived as imposed, troublesome and something to be afraid of, or at least as a barrier to be overcome.

"It's important that we talk the same language. Very often the languages we use differ a lot, like on the Tower of Babel, they've become mixed up. IT experts talk their way, physicians – their way, patients – their way. Everyone talks about something else... while using identical words. [...] That's why reaching a consensus, a final one while planning and creating a new solution, for example, of IT kind... it's like going through a trial by ordeal with the whole interdisciplinary team." (Buyer 1)

The suppliers of ICT were in general critical of buyers' ability to conduct tenders, especially the way they describe what they want from the product. They think it is the main reason behind buyers' dissatisfaction with the e-health solutions procured.

"And here we arrive at the heart of the problem. [...] The biggest problem from my point of view is that a buyer is not capable to articulate and specify requirements in a way necessary for a proper description of the object of procurement. [...] Because, well. How can someone describe what they need if they never saw it?" (Buyer 2)

The mindset exemplified in the above statement itself seems to hinder the success of e-health because it presumes that only existing solutions can be procured.

2.5. Financing models

There are no comprehensive financing policies regarding IT in general, and e-health in particular, at the national level. This leaves hospitals to fend for themselves unless there is a regional (region, voivodship) policy in this area. In fact, there are substantial differences in e-health development between Polish regions. Insufficient funding, especially for larger projects, was repeatedly mentioned by buyers as an obstacle to investing in more complex e-health products. One vital source of money for such investments are the EU funds mentioned above. Failure to secure EU funds was often cited as a reason for abandoning e-health projects altogether. They are deemed necessary for development by all stakeholders, but – according to suppliers – too often used for projects of debatable value:

"The hospital gets something new, but after the project is over – that is, after around five years – a problem emerges: how to keep it running?" (Supplier 2)

E-health is rarely described as an investment improving the cost-effectiveness of treatment, but rather as a tool facilitating data management and administrative tasks. A buyer (a hospital IT system administrator) expressed slightly different concerns, questioning the allocation of scarce health care resources:

"Is there a point investing in the [IT] equipment if you can invest this money in the process of treating patients?" (Buyer 2)

This comment may echo concerns of decision-makers within health care system, faced with under-investment and shortages.

Suppliers also point out that many hospitals hardly have the resources needed to employ qualified IT specialists, let alone to pay for their professional development. They consider the absence of such expert input in the procurement process a major obstacle not only to agreeing on a desired product's characteristics but also to successful implementation. Not all hospital managers seem to realise this, as one hospital IT system administrator mentioned:

"Unfortunately, it [hardware IT infrastructure] is so changeable, that the directors delude themselves that they'll spend money [on it] just once, and they'll have peace of mind for years. It's simply not true. Investment in IT is constant. Constant." (Supplier 2)

Clearly, e-health suffers from the lack of investment policies that would support long-term thinking about ICT. However, cost-efficiency (or lack thereof) in comparison to traditionally delivered services was not talked about by the respondents. Instead, they focused on streamlining administrative procedures and reaching patients in need. Purchases and investments seemed to stem primarily from a formal requirement (e.g. use of national insurance-verification system needs access to the Internet), a chance to get funding (mainly EU funds), or a desire to acquire something "new and modern-looking".

"And then they say 'Yes, we're getting [self-service] terminals for patients. [...]!' My goodness, why

another contraption that will just stand there somewhere? What is it supposed to be doing?" (Supplier 2)

Part of the explanation may be that public health care is not ruled by free market logic, as explained by one of the suppliers:

"[...] it shows why solutions like e-registration are most often superfluous in the case of public hospitals. [...] I'm sorry, I misspoke. They're superfluous from the point of view of the hospital and ambulatory care managers. Because they're convinced, and that's how it really is. A hospital or an ambulatory clinic director knows that, if there isn't an e-registration, they're going to have a lot of patients." (Supplier 1)

2.6. Health professionals' resistance

The medical community's attitude towards e-health and acceptance of specific solutions is of paramount importance for success (or failure) of e-health implementation. Consequently, medical professionals' reluctance may potentially be a serious barrier to e-health. Only one of the respondents was a doctor who is heavily involved in telemedical projects. The vast majority of the respondents were of the view that in general physicians hold an adverse attitude towards telemedicine. One of the interviewees pointed out that in the current financing scheme, procedures (not results) are contracted by the public payer. This encourages doctors to conduct services, not to cure patients. Introducing more transparency and control might not be welcomed by this professional group due to (assumed by the Supplier 1) cynical personal motivations and financing system's failure:

"[...] it's hard to say whether doctors would be at all interested in something like that [EHR] because of, let's put it that way, a not entirely healthy system of financing health care that functions in Poland. I mean, in Poland it is treating a patient, not curing a patient, that is financed." (Supplier 1)

Another respondent ascribed physicians' reserve to both economic fears and attachment to the principle of medicine as an art.

"[...] the doctors community has always been... mmm... distrustful of these solutions, naturally being afraid of losing their jobs... [...] it is generally thought that the doctors community has always been very cautious, they have always believed that despite all, [...] physician should examine the patient organoleptically and that seeing the patient through some camera somewhere out there, or an attempt at consultation on the basis of basic tests sent electronically [...]... they simply think it is not trustworthy and are afraid of it." (Supplier 2)

This notion is confirmed to a certain degree by research into medical professionals' attitudes towards various types of e-health. For example, Duplaga and Grysztar (2013) found out that physicians accept e-health solutions that serve education, administration and data transfer. However, their support for remote consultations is very low. However, Zgliczyński et al. (2013) presented results evidencing a more sympathetic attitude towards telemedicine (especially telemonitoring and cardiologic services). The main barriers in their view were the lack of financing and infrastructure. Both studies focused on relatively young doctors (around 40). The obvious contradiction between these two surveys suggests a need for further investigation. In the undergoing quantitative research (surveys) carried out as a part of the same project, physicians' resistance to telemedicine was noted by the physicians themselves. The phenomenon will be further analysed as it is particularly significant for the development of e-health in Poland.

Conclusions

The next few years will likely be a decisive period for e-health development in Poland. For a prolonged period, computerisation of health care has been plagued by underfunding, failed projects and delays. While some forms of e-health (e-registration, EHR) gained some popularity, telemedicine was at a stalemate, mainly because of its precarious legal status. Legal obstacles to any form of remote consultation involving a patient prevented the development of such services. It was particularly frustrating for suppliers of e-health solutions and experts in the field. In 2015, the legal stalemate was largely resolved, making the development of telemedicine possible.

Proactive steps taken by the national payer (NFZ) towards contracting telemedicine are signs that telemedicine (and likely other branches of e-health) has a good chance of going mainstream. It is worth noting that even if NFZ does not seem to have a comprehensive strategy for telemedicine (or it does not make it public), it certainly seems to have priorities concerning investment in certain specialities (geriatrics, cardiology, psychiatry). The national payer is also cautiously starting with small-scale pilots. The process of telemedicine reimbursement is at such early

stages though that no information regarding the success of contracted services is yet available. Some doctors' reluctance to conduct consultation in this way, confirmed by both literature and the interviewees in this research, will certainly be tested. It is still too early to establish if it would constitute a barrier to e-health development. However, demographic changes, such as a new generation of doctors who regard ICT-based solutions as a norm, could influence the attitude of this professional group.

Since the introduction of the amendment to the Act on the System of Information in Health Care increased, and indeed unprecedented, media attention is given to patient data safety. As a result, previously ignored and potentially serious shortcomings have been uncovered in this area. This trend will probably continue as national EHR system is due (again) to be introduced. Tellingly, in interviews conducted before the legal changes took place, interviewees did not express many concerns for data safety, with some suppliers considering restrictive data protection regulations an obstacle to using newest technologies. Both existing (deficient) solutions and lack of appreciation for the issue may potentially prove to be obstacles to the development of e-health because of undermining of public trust in the safety of ICT in healthcare.

Basic IT infrastructure still is not universally present in Polish hospitals. It remains an open question how much should be invested in it, how to pay for IT specialists' salaries, for maintenance and updates. This barrier, mentioned by all categories of respondents, is likely to persist unless a national programme of e-health is prepared and implemented, securing funds for development of e-health nationwide. Further recognition of e-health services by NFZ, and contracting these kinds of services, may also contribute to investments in IT infrastructure.

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DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 10 December 2016
accepted: 30 May 2017

pages: 73-81

Factors impacting on patient compliance with medical advice: empirical study

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ABSTRACT

The purpose of this paper to identify factors which have a bearing on compliance with medical advice in various age groups. The survey was conducted, using the CAWI method, on a representative sample of 1000 respondents who declared having used healthcare services in the previous six months. Control of competences is one of the strongest factors which is common for the oldest and youngest groups. Interestingly, trust in the integrity and honesty of doctors is significant for the youngest patients, i.e., the higher is the level of trust, the lower is the tendency to non-comply. Another type of trust is related to the benevolence of doctors and is significant to patients of the middle age group. Satisfaction is a significant predictor in the two oldest groups of patients. High levels of satisfaction seem to deter people from non-adherence to recommended treatment regimens. The results of the present study provide knowledge about the nature and diversity of factors behind patient compliance in various age groups.

KEY WORDS

compliance with medical advice, doctor–patient relationship, trust, satisfaction

DOI: 10.1515/emj-2017-0016

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Introduction

The increase in the degree patient compliance with medical recommendations brings considerable clinical and economic benefits for both patients and entire healthcare systems. However, it is not an easy goal to achieve because of numerous factors that can influence the behaviour of patients. To encourage people to be compliant, service providers must identify the determinants of compliance with medical recommendations and understand what barriers may discourage patients from desirable behaviour patterns (Krueger et al., 2005; Golin et al., 2002). Numerous studies devoted to this issue concern patient factors, i.e. social and demographic characteristics of patients (Golin et al., 1996), economic and environmental determinants, and the significance of the type

of illness (Catz et al., 2000). Considerable attention has also been paid to the influence the age of patients has on compliance, although such analyses usually concern selected medical conditions (Hinkin et. al., 2004; Michetti et. al., 2016; Krueger et. al., 2015). Research results indicate that with age patients become more obedient and scrupulously follow medical recommendations. However, such conclusions seem unsatisfactory when one considers the multidimensional consequences of failure to adhere to medical regimens. Therefore, this paper aims to identify factors that have a bearing on compliance with medical advice in various age groups based on results of representative surveys.

1. Factors determining compliance with medical advice

Compliance with medical advice is understood as the degree to which a patient's behaviour associated with taking medication, adherence to recommended diet, or other changes in lifestyle are consistent with the advice of their physician. This definition implies that the medical recommendations are correct and beneficial for the patient and that the patient's rational behaviour should mean following that advice (Roberson, 1992).

As research results suggest, patient compliance depends on a number of factors, which have been grouped into several categories: patient factors (Golin et al., 1996; Murphy et al., 2000; Roberts, 2000), characteristics (complexity) of treatment schedule (Cramer et al., 1989; Turner et al., 2000; Ostrop et al., 2000), nature of the doctor–patient relationship (Anderson, 1990; Rost, 1989; Kaplan et al., 1989), type of disease, social and environmental factors (Catz et al., 2000; Gordillo et al., 1999). Sometimes, the outcomes of research are ambivalent due to relatively low values of correlation coefficients (Vermeire et al., 2001). However, it has been indicated that older age, a higher level of education, higher socio-economic status, as well as being retired and married, are associated with better compliance with treatment (Thomas et al., 2006). Other positive factors include an accessible and comprehensible form of communicating medical information, continuity of healthcare, patient satisfaction, shorter intervals between appointments, and shorter waiting time (Thomas et al., 2006; Griffth, 1990).

Meanwhile, the complexity of advice regarding therapy methods and insufficient communication between doctors and patients are mentioned as the main reasons for non-compliance with treatment, particularly among older patients with memory impairment (Donovan, 1995).

Other potential ways to enhance the degree of patient compliance include the types of prescribed medications and techniques to encourage patients to take right doses. And yet, research results unequivocally disprove the efficiency of such practices. Simplification of drug treatment schemes, prescribing fewer medications to be taken at a given time, and development of longer-acting medicines result in simplified treatment regimens rather than in better adherence indicators (Vermeire et al., 2001).

It is the relationship that is established between a patient and a doctor that determines whether the former will comply with the latter's recommendations. However, the nature of this relationship is rather difficult to examine (Vermeire et al., 2001). This is particularly true as regards the duration and frequency of appointments and the quality of this relationship: attitudes of a physician towards patients, their respect for patient concerns, their empathy, and the manner of conveying information (DiMatteo, 1994). This last factor has been investigated in more detail. It turns out that a clear explanation of the correlation between treatment and disease increases the likelihood of good compliance with doctor's recommendations. On the other hand, describing the effects of therapy can adversely affect patient behaviour. Meanwhile, an educational approach aimed at helping patients understand treatment guidelines leads to better adherence to medical advice (Donovan, 1995).

Therefore, from the point of view of a patient, interpersonal skills of doctors are one of the key factors taken into account when assessing the performance of physicians (Anderson & Dedrick, 1990; Mead & Bower, 2000; Mercer et al., 2001; Assem & Dulewicz, 2014). Among these skills, one should mention the ability to inspire patient trust (Mechanic & Meyer, 2000; Hall et al., 2001; Maynard & Bloor, 2003; da Silva Terres et al., 2015). The character of the doctor–patient relationship is a crucial factor that enables the achievement of the desired health outcomes. Medical services belong to the category of high-consequence exchanges, i.e. are associated with difficult choices which might induce stress and strong emotional reactions (Botti et al., 2009; da Silva Terres et al., 2015). This explains why trust is so tremen-

dously significant for healthcare services. Dugan et al. (2005) define it as the patient acceptance of dependence and belief that the doctor will ensure the provision of medical service with the patient's interest in mind (Hall et al., 2001; Gilson, 2003).

Lack of trust can contribute to patient dissatisfaction and a sense of threat to one's health (Zineldin, 2015). Nowadays, patients are increasingly better informed and more willing to participate in decisions regarding their health. As a result, the interdependence of doctors and patients is stronger, which means that trust is more dependent on communication, information conveyed during appointments and other factors which strengthen the reliability of doctors' actions (Rowe & Calnan, 2006; Assem & Dulewicz, 2014). The shift in the nature of the doctor–patient relationship from paternalism to partnership may significantly influence the attitude of patients towards health-related issues, including compliance to treatment. Decisions regarding the course of therapy are taken jointly after the patient has been appropriately informed of any relevant facts that enable him or her to take such decisions (Vermeire et al., 2001). Patient participation in the care-related decision-making is associated with positive outcomes, such as enhanced adherence, improved illness-related knowledge and health behaviour (Castroa et al., 2016; Bertakis & Azari, 2011). This type of involvement seems to be the optimal option both for the patients and doctors (Szymańska, 2016).

The results of a study by Thom (2001) emphasise the significance and impact of the trust in doctors on patient behaviour. According to the author, higher levels of trust ensure a greater likelihood of appropriate absorption of medical information as well as compliance to new drug regimens and acceptance of treatment methods and diagnostics. Krawczyńska (2013) points out that trust in physicians helps create positive patient attitudes to medical innovations and the degree in which they are used in therapy (despite information about the low efficacy of new medical procedures). Erosion of trust leads to other negative consequences, e.g. doubt in medical advice, self-medication or modification of medical recommendations (Krot & Rudawska, 2016).

Moreover, research results indicate that distrust affects adherence by increasing treatment-related psychological distress and weakening treatment benefit beliefs (Thrasher et al., 2008). Distrust stemming from overgeneralisation is a neutral or even hostile attitude towards other unfamiliar members of society. The definition holds that distrust is expressed by such behaviours as guardedness, control (bureaucratic and legal), monitoring, and alertness. Finally, distrust is reflected in social restrictions, i.e. withdrawal from social bonds or business contacts, reluctance to co-operate or share resources (Lewicki & Mcallister, 1998). Generalised distrust results in an unwillingness to co-operate, which, in turn, weakens the social efficiency of the system.

Patient satisfaction is undoubtedly another factor behind the degree of patient compliance. Satisfaction has a strong impact on the health-related behaviours of patients. Study results show that contented patients are more conscientious when it comes to complying with their doctors' advice (McKinley et al., 1997) and follow the recommendations they have received (Grogan et al., 2000; Dang et al., 2013).

Meanwhile, dissatisfied patients change doctors more frequently, which not only disrupts the treatment process but is also costly for patients themselves as well as for the entire healthcare system (Baker, 1990; Andaleeb, 2001). Besides, satisfaction with a medical appointment is a vital aspect that influences further health-related decisions. Satisfied patients return to their doctors more often should such a need arise (Ramsaran-Fowdar, 2005).

2. Age of patients and compliance with medical advice

The results of numerous studies clearly indicate that age is a strong predictor of one's beliefs about therapy effectiveness and adherence (Reynolds et al., 2004). Older age tends to be associated with significantly better medication adherence (Hinkin et al., 2004; Michetti et al., 2016; Krueger et al., 2015). The higher adherence amongst older patients might be due to their unwillingness to take risks related to their health (Michetti et al., 2016). Other authors point out that taking medication possibly requires less alteration in lifestyle for older people or these lifestyle alterations necessary for successful adherence are less burdensome for older individuals, who may be able to easier accommodate pill-taking into their daily lives. Older individuals are more likely to have prior experience taking medication for other age-related illnesses and, therefore, may already have become more accustomed to such a routine (Barclay et al., 2007).

Besides, older patients might have a greater awareness of mortality and thus have a stronger motivation to adhere to the advice of their physicians. Scrupulous compliance with medical instructions might partly contribute to the lengthening of these patients' lives, as well as explain the statistically significant difference between older and younger patients (Barclay et al., 2007).

The results of multivariate analyses prove that among younger patients, perceived treatment utility and heightened feelings of self-efficacy are both predictive of adherence. Younger patients believe in their own capabilities and must trust in the recommended treatment methods to follow medical recommendations. The outcomes of surveys among older patients are vastly different. It turns out that neither of the above variables influenced patient adherence to the recommendations of their doctors (Barclay et al., 2007).

3. Research methods

The studies conducted so far demonstrate that compliance with medical advice is strictly dependent on several determinants, both patient-related, including the demographic factors (Murphy et al., 2000; Roberts, 2000), and those related to the course of the therapeutic process (Ostrop et al., 2000; da Silva Terres et al., 2015). Despite some difficulty in identification of such a set of factors, age is definitely a variable to be taken into account (Krueger et al., 2015; Krivoy et al., 2015). Additionally, it seems that factors which impact patient behaviour can vary depending on the age of an individual, although little research has been devoted to this issue (Barclay et al., 2007). Therefore, the purpose of the present study is to attempt identifying the factors which determine compliance with medical advice in different age groups.

The statements used in the questionnaire, which measure each variable (trust, distrust, satisfaction, and medical compliance) have been developed based on literature study (Tab. 1). Each statement was presented to respondents with a five-degree Likert scale. The scales gauging the variables were verified by means of a factor analysis.

The survey was conducted in years 2015/2016, using the CAWI method, on a representative sample of 1000 respondents who declared having used healthcare services in the previous six months. Tab. 2 sums up the characteristics of the research sample.

4. Research results

Compliance with medical recommendations was analysed by means of statements on taking medications, following the schedules designed by doctors or recommended changes in lifestyle (on a five-point Likert scale from 'definitely agree' to 'definitely disagree'). Respondents declared they tended to adhere to medical advice, although some of them admitted that complying with treatment regimens could be troublesome. The greatest difficulties in following recommendations were related to changes in lifestyle, i.e. altering a diet or levels of physical activity (arithmetic mean 2.85). Moreover, patients occasionally forgot to

Tab. 1. Bibliographical references

VARIABLE	BIBLIOGRAFICAL REFERENCES
Trust in doctor's competences	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Control of doctor's competences	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Trust in benevolence and emotional support	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Belief that doctors act in the interest of patients	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Trust in the quality of communication	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Trust in the integrity and honesty of doctors	Anderson & Dedrick, 1990; Dugan, Hall & Trachtenberg, 2005
Adherence to Refills and Medications scale — ARMS — 13 statements	Kripalani et al., 2009
Distrust resulting from overgeneralisations	Skarżyńska, 2012
Patient satisfaction	Elleuch, 2008; Schee, Groenewegen & Friele, 2006; Trumble, O'Brien, O'Brien & Hartwig, 2006; van der Schee, Groenewegen & Friele, 2006

Source: authors' work based on literature review.

Tab. 2. Structure of research sample

INCOME			GENDER		
	NUMBER	PERCENT		NUMBER	PERCENT
Up to PLN 1000	79	7.9	woman	600	60.0
PLN 1001 to PLN 1400	91	9.1	man	400	40.0
PLN 1401 to PLN 1800	108	10.8	AGE		
PLN 1801 to PLN 2000	110	11.0	18-24	76	7.6
PLN 2001 to PLN 2500	74	7.4	25-34	176	17.6
PLN 2501 to PLN 3000	122	12.2	35-44	175	17.5
PLN 3001 to PLN 5000	158	15.8	45-59	287	28.7
Over PLN 5000	126	12.6	Over 60	286	28.6
Difficult to say	44	4.4			
PLACE OF RESIDENCE			LEVEL OF EDUCATION		
Village	335	33.5	primary	66	6.6
Town up to 100,000 residents	340	34.0	vocational	182	18.2
Town 100,000 - 499,000 residents	183	18.3	secondary	383	38.3
Town over 500,000 residents	142	14.2	university	369	36.9

Source: authors' work based on survey results.

take prescribed drugs (arithmetic mean 2.35), failed to fill a prescription (arithmetic mean 2.35), failed to take medication (arithmetic mean 2.37), or even discontinued treatment of their own accord (arithmetic mean 2.30).

Because the respondents were asked about a variety of behaviours relating to compliance with medical advice, the conducted factor analysis aimed at classifying that wide array of behaviours into relatively uniform subcategories. The factor analysis was performed with the varimax method. Each factor was given a category based on the value of factor loadings. For each identified category, statistical rigour was verified, which proved to be satisfactory as Cronbach's alfa equalled 0.64.

A category labelled 'patient disobedience' was identified among the studied behaviours, and meant an inclination to change drug dosage independently (Q6), stop taking medication altogether (Q7), or even abandon treatment (Q9) as well as refuse to comply with recommendations regarding lifestyle changes (Q12). This category also comprises failure to fill a prescription (Q3).

As previous research results indicate, there are several factors that impact the degree, to which medical recommendations are respected. Because of this, before analysing the outcomes of the discussed survey, it was assumed that 'patient disobedience' could be affected by: all the dimensions of trust in physicians, generalised distrust, satisfaction, and demographic variables gender and education.

Tab. 3. Results of the factor analysis

VARIABLES	FACTOR - DISOBEDIENCE
Q_3	0.61
Q_6	0.54
Q_7	0.76
Q_9	0.70
Q_12	0.42

Source: authors' work based on survey results.

Patient confidence in their physicians, analysed by means of a five-point Likert scale, consisted of four dimensions confirmed by a factor analysis (varimax method). Each factor was given a category based on the value of factor loadings. Apart from trust in the competences of doctors, the conducted analysis allowed the author to identify four additional dimensions: control of competences, trust in benevolence and emotional support for patients, belief that doctors acted in the best interest of their patients, trust in the quality of communication, and trust in the integrity and honesty of doctors.

Like trust, distrust resulting from overgeneralisation was measured using a five-point Likert scale. Using a factor analysis, two dimensions were identified: relational distrust (Cronbach's alfa: 0.25) and distrust of strangers (Cronbach's alpha: 0.55).

Tab. 4. Factors influencing adherence to medical advice among respondents up to 34 years of age: the regression model

VARIABLE	B*	ST. ERROR OF B*	B	ST. ERROR OF B	T(232)	P
Constant			11.40	2.16	5.27	0.00
Control of competences	0.25	0.06	0.35	0.09	4.09	0.00
Trust in integrity and honesty	-0.23	0.09	-0.24	0.09	-2.65	0.01
Gender	-0.12	0.06	-0.99	0.47	-2.10	0.04
Relational distrust	0.13	0.06	0.18	0.08	2.15	0.03
R^2=0.19 F(6.232)=9.19 p<0.00 std. error of estimation: 3.60						

Source: authors' work based on survey results.

Tab. 5. Factors influencing adherence to medical advice among respondents aged 35–44 years: the regression model

VARIABLE	B*	ST. ERROR OF B*	B	ST. ERROR OF B	T(147)	P
Constant			14.41	3.01	4.77	0.00
Satisfaction	-0.30	0.09	-0.19	0.06	-3.17	0.00
Distrust of strangers	0.19	0.08	0.33	0.14	-2.34	0.02
Trust in benevolence and emotional support	-0.19	0.09	-0.20	0.09	2.08	0.04
R^2= 0.11 F(4.147)=4.28 p<0.00 std. error of estimation: 4.05						

Source: author's work based on survey results.

Satisfaction is a one-dimensional construct and was gauged using eight statements in a five-point Likert scale format (Cronbach's alpha: 0.85).

Bearing in mind the purpose of this paper, i.e. identification of factors determining patient compliance in particular age groups, a multiple regression analysis was performed, using the method of stepwise regression, where the tendency to disobey medical advice was the dependent variable, while the above-mentioned determinants were independent variables, and the age of the respondents (divided into three categories: up to 34 years of age, 35–44 years and above, and over 45) was the grouping variable. As a result, three models containing statistically significant factors influencing patient compliance were obtained.

Three main dimensions of trust have a crucial impact on adherence to medical advice by the youngest respondents (up to 34 years of age): control of competences (positive correlation) and trust in the integrity and honesty of doctors (negative correlation), as well as relational distrust (negative correlation) and gender (Tab. 4). Among the youngest patients, control of competences is the strongest determinant of disobedience, i.e. the more a patient is inclined to verify the diagnoses provided by doctors, the more often one becomes insubordinate, changing treatment regimens of one's own accord. At the same time, the greater the declared distrust in relationships with others, the more proclivity to disobedience. Meanwhile, confidence in the integrity and honesty of doctors is a factor that prevents respondents from disobeying their medical recommendations. It is worth mentioning that among the youngest patients, it is men who are more likely to ignore medical advice.

In the second age group, i.e. people aged 35–44 years (Tab. 5), factors determining compliance with medical advice turned out to be slightly different. For these respondents, patient satisfaction as well as trust in the benevolence of doctors and emotional support proved to be statistically significant factors that influenced their adherence to medical recommendations. Moreover, their compliance was largely affected by their distrust of strangers: the higher it was, the greater was the 'independence' of patients.

As far as the oldest age group is concerned, patient compliance is determined firstly by control of competences (positive correlation), patient satisfaction (negative correlation), and the gender of the survey participants (Tab. 6). The greater is the need to control the diagnoses made by doctors, the higher is the likelihood that the patients will arbitrarily change treatment regimen. On the other hand, as the satisfaction of patients grows, their tendency to defy medical advice diminishes. Gender is a factor that determines patient compliance to slightly a lesser extent. Women show less inclination to disobey.

Tab. 6. Factors influencing adherence to medical advice among respondents over 45 years of age: the regression model

VARIABLE	B*	ST. ERROR OF B*	B	ST. ERROR OF B	T(474)	P
Constant			11.87	1.45	8.17	0.00
Control of competences	0.18	0.04	0.28	0.07	3.92	0.00
Satisfaction	-0.14	0.06	-0.10	0.04	-2.50	0.01
Gender	-0.08	0.04	-0.71	0.39	-1.80	0.07
R^2= 0.05 F(4.474)=6.67 p<0.00 std. error of estimation: 4.18						

Source: authors' work based on survey results.

In the last model, the r2 indicator amounts to 5%, which might mean that only 5 percent of the variability of the dependent variable patient compliance is explained by the independent variables, i.e. those included in the model. In the social sciences, where it is hard to specify such models, low R-square values are often expected. Consequently, researchers recommend considering such models be provided that the independent variables are statistically significant because only then their predictive value is confirmed. Possible doubts arise as to the precision of explanation, although in social sciences, this is less important (Bedeian & Mossholder, 1994).

Conclusions

Improving the degree, to which patients adhere to their medical advice has a great significance for the state of their health as well as the condition of the entire healthcare system. For this reason, numerous researchers have devoted their studies to this problem (Cramer et al., 1989; Vermeire et al., 2001; Golin et al., 2002). Interest in this research area is motivated not only by concern for the potential consequences of non-compliance with medical regimens but also stems from the variety of reasons for the 'insubordination' of patients. If we specify what these reasons are, it will be possible to prevent undesirable behaviours.

The age of a patient is a factor that determines the consistency of adherence to medical recommendations (Hinkin et al., 2004; Michetti et al., 2016; Krueger et al., 2015). This explains why attempts have been made to identify the factors that influence the level of patient disobedience in three age groups. As the results of previous research indicate, the reasons for willingness to comply can be found in the quality of the doctor-patient relationship, i.e., among other things, trust in the doctor (Thom, 2001), satisfaction with the medical appointment (McKinley et al., 1997; Grogan et al., 2000; Dang et al., 2013), and the overall distrust towards strangers (Thrasher et al., 2008).

Control of competences is one of the strongest factors which is common for the oldest and youngest groups. In both of these age groups, constant verification of doctors' decisions leads to a greater freedom of interpreting medical advice and introducing arbitrary changes to medical regimens, i.e. alterations in treatment methods, drug dosages, or even discontinuation of prescribed medications. Interestingly, trust in the integrity and honesty of doctors is significant for the youngest patients, i.e., the higher is the level of trust, the lower is the tendency to non-comply. Meanwhile, among older patients, this kind of trust is not important at all. Another type of trust is related to the benevolence of doctors and is significant to patients of the middle age group. Satisfaction is a significant predictor in the two oldest groups of patients. High levels of satisfaction seem to deter people from non-adherence to recommended treatment regimens.

The behaviour of patients, particularly younger ones, is also dependent on the level of distrust. However, in the youngest age group, relational distrust plays the most important role, while in the age group 35–44, distrust of strangers is more significant.

Having analysed the determinants of patient behaviour, one can conclude that the compliance of the youngest patients depends on the relational approach, i.e. the ability to build trust-based relationships with more or less familiar doctors or other strangers, to a greater extent than in the other age groups. In the age group 35–44, patients are more responsive to 'enjoyment', i.e. their level of obedience depends on a satisfying and congenial atmosphere. Meanwhile, the behaviour of the oldest patients is solely dependent on the character of their relationship with a doctor.

The results of the present study confirm that age is a strong determinant of patients' adherence to medical advice. Additionally, they provide knowledge about the nature and diversity of factors that lie behind patient compliance in various age groups. This knowledge can prove particularly useful to doctors as it offers guidelines for creating such relationships with patients that will encourage and motivate them to follow the recommendations of their physicians.

Acknowledgements

The study has been conducted as part of the project S/WZ/2/2017 and financed by the Ministry of Science and Higher Education (MNiSW).

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 5 December 2016
accepted: 5 June 2017

pages: 82-89

Using tools of strategic management in medical facilities of Lublin region

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ABSTRACT
The purpose of this article is to evaluate the use of tools of strategic management in hospitals in Lublin region.
The study was conducted among 14 medical entities from the area of Lublin Voivodeship. The survey was addressed to economic directors or chief accountants of health care facilities and sent by post. The questionnaire was also helpful in conducting an in-depth interview as it provided a required structure. As part of the interviews with managers of health care facilities, information beyond the questionnaire was acquired, e.g. about the mission. According to studies, most health care facilities develop strategic plans (71.4%). For 21.4% of the studied facilities, the strategic plan is known mainly to management. In contrast, 28.6% of entities do not have a strategic plan. The presented results of the research can increase the effectiveness of activities in each area of the health care facility, continuous process improvement and rapid response to changes in the environment.

KEY WORDS
medical facilities, hospitals, strategic management

DOI: 10.1515/emj-2017-0017

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Introduction

In recent years, healthcare changes in general and those relating to the system of financing, the increase in the accountability of management of medical entities for their performance in particular, have posed new challenges for health care facilities (Kogut, 2009).

In their present form, health care entities operate on the border of the public sector and business sector, and although they have to fulfil a socially important mission in helping all citizens of our country, their daily operation must be economically efficient (Jarosinski, 2014).

If these entities want to manage the existing resources more efficiently and want to respond to changes occurring in the environment in a better and more efficient manner, they must, on the one hand,

build business models, and on the other hand, properly implement them through strategies.

The purpose of this article is to evaluate the use of tools of strategic management in hospitals in Lublin region.

1. Literature review

The transfer of management practices from business firms in private or for-profit sector to hospitals has a long history, dating back to the beginning of the twentieth century. It began with the advocacy of scientific management principles for hospitals and continues at present as hospitals are admonished to adopt practices such as diversification and total quality management. While the specific practices have changed, the claims that their adoption will better hospital management, improve efficiency and even assure the survival of hospitals have endured (Arndt & Bigelow, 2000).

The basic principles of the strategy were described, among others, by Sun Tzu, Homer, Euripides and many other ancient strategists and writers (Swayne, Duncan & Ginter, 2012).

'Strategy' is a word with many meanings and all of them are relevant and useful to those who are charged with setting a strategy for their corporations, businesses, or organisations.

Alfred D. Chandler defined a strategy as 'the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources for carrying out these goals' (Chandler, 1962).

Michael Porter defined a competitive strategy as 'a broad formula for how a business is going to compete, what its goals should be, and what policies will be needed to carry out those goals' (Porter, 1986).

Henry Mintzberg indicated that a strategy is a plan, a pattern, a position, a perspective and, in a footnote, he indicated that it can also be a ploy, a manoeuvre intended to outwit a competitor (Mintzberg, 1994).

A more recent entry appears in the Strategic Planning for Public and Non-profit Organisations, published in 1996 by John Bryson. He defines a strategy as 'a pattern of purposes, policies, programs, actions, decisions, or resource allocations that define what an organisation is, what it does, and why it does it' (Bryson, 1996).

In the literature on the subject, there are many approaches. For the purpose of this paper, the definition of a strategy proposed by Gierszewska was adopted. An organisational strategy is a general programme for defining and implementing the objectives of the entity and the performance of its mission, which contains a system at the time of the reaction of the entity to its surroundings (Gierszewska, 2012).

Formulating the strategy and its implementation is the interest of strategic management.

Many variations of a strategic management model have emerged in both the business and healthcare sectors, but the basic model has remained relatively unchanged since its inception. Simyar, Lloyd-Jones, and Caro tailored the process to healthcare strategic management: identify the current position of an organisation, including the present mission, long-term objectives, strategies, and policies; analyse the environment; conduct an organisational audit; identify the various alternative strategies based on relevant data; select the best alternative; gain acceptance; prepare long- and short-range plans to support and carry out the strategy and implement the plan and conduct an on-going evaluation (Simyar, Lloyd-Jones & Caro, 1988).

Strategic management has been the interest of managers of health care facilities for many years. Unfortunately, under the Polish conditions, the procedure for creating a strategy is forced on many hospitals by the legal system and in many cases proved to be impossible to implement; consequently, managers could not utilise the strategic control.

Therefore, actions should be considered to ensure the strategic management of a medical facility is to bring the expected results. The principles of building a strategy in relation to health care facilities can be limited to a few conditions (Briman, 2002):

- the health care facility must have a well-organised system of internal information,
- the health care facility must determine its future position as precisely as possible, using all available sources of knowledge and possibilities to influence the environment,
- the health care facility must determine the internal conditions for implementing the strategy, and, therefore, the available resources,
- the health care facility must make the best possible choice from several variants of the strategy developed jointly by the management, establishing bodies and employees. To select variants, it is necessary to extract some key determinants, significantly affecting the future of the hospital,

- the health care facility must develop a strategic plan, that is a path of reaching the proposed solutions, using existing resources,
- the health care facility management must obtain the support of the staff for the introduced strategy,
- the health care facility management should provide the ongoing supervision and monitoring of progress in the realisation of the strategy at each stage of the strategy implementation, and later, at the stage of its realisation.

These measures not only guarantee the development of a good strategy but also a stable future and lower risks associated with changes in the environment.

2. Research methods

The need for analyses in the scope of using tolls of strategic management in the health care facilities requires the prior presentation of the general characteristics of the studied sample.

Of the 40 questionnaires sent out, 14 completed questionnaires were returned, representing a response rate of 35 percent. Studies were undertaken in 2012.

The study looked at 14 medical entities from the area of Lublin Voivodeship. All the studied hospitals provide stationary diagnostic, therapeutic and rehabilitation services within the scope of their activities. Individual hospitals differ in the number of wards, number of beds, number of employees, organisational structure and the amount of financial resources at their disposal.

The survey was addressed to economic directors or chief accountants of health care facilities and sent by post. The questionnaire was also helpful in conducting an in-depth interview as it provided a required structure. As part of the interviews with managers of health care facilities, information beyond the questionnaire was acquired, e.g. about the mission.

In nearly 80% of facilities, the main founding body for the studied health care facilities was their local government administration. 14% of the facilities were established by state medical universities and one health care facility was established by a government administration body, i.e. the Ministry of Defence.

Most of the studied facilities were located in a town (43%), 35% facilities were located in Lublin, and the remaining facilities (21%) operated in communal centres.

The largest number of the studied health care facilities was characterised by the number of beds above 500 (28.7%). In terms of the number of beds, health care facilities had from 301 to 400 and 401 to 500 (21.4% each) of beds. Furthermore, it should be noted that in the studied sample of facilities, there are no small entities with up to 50 beds.

3. Research results

Changes that can be observed in the health care system cause the need for professional management in health care facilities with the use of modern tools, both on the strategic and operational level.

According to studies, most health care facilities develop strategic plans (71.4%). For 21.4% of the studied facilities, the strategic plan is known mainly to management. In contrast, 28.6% of entities do not have a strategic plan. This may be because these plans are not regarded as helpful in the facility management but rather as a requirement of various authorities.

An important thing that enables the design of adequate strategic plans is the appropriate diagnosis of the health care facility, which includes internal and external factors. This applies both to the general and target environment — institutions and organisations directly cooperating with the hospital, which includes, e.g., health care payers (Talaga, 2004).

The studied health care facilities use a variety of methods and tools in analysing the environment for the purposes of strategic management.

The most common tool used in strategic management is the analysis of strengths and weaknesses (64.2% of respondents). The SWOT analysis, according to interviews with facility managers, makes it possible to determine through further analyses how to use strengths of the facility to take advantage of opportunities emerging in the environment, and what to do to improve weaknesses. 42.9% of the studied health care facilities use the break-even point analysis. Few health facilities carry out the PEST analysis (14.3% of respondents), which helps to identify the main factors affecting the functioning of the health care sector in each of the spheres: political, economic, social and technological. None of the surveyed health care facilities applies the balanced

scorecard. This may indicate a relatively low knowledge of this tool among health care managers.

The strategic analysis begins with an analysis of the external environment and the analysis of the health care facility. The results of this analysis provide the basis for determining the mission and goals of the health care facility, and these, in turn, are used to determine the strategy.

The strategy of a health care facility is based largely on shaping the relationship between the organisation and the environment, which requires the determination of its long-term goals (Marciniak, 1998). The environment of the health care facility has a very large impact on its functioning. Half of the analysed entities evaluate the environment as varied, the other half as stable or rarely changing. Only for one health care facility, the volatility of the economic environment was so high that the environment was rated as turbulent. Market conditions, under which most of the studied health care facilities operated, forced these entities to apply constant changes and systematic actions to adapt to new criteria of the functioning in the environment.

Under such variable conditions, it is very difficult to operate and plan any measures to improve efficiency and profitability because the possible consequences on the facility resulting from the present and future changes in the environment cannot be fully predicted.

The studied health care facilities must assess factors that affect the strategic management in the entity. The assessment was made according to a four-point scale, from 0 to 3, where 0 meant not taking a given factor into account, and 3 meant great importance, so it was the highest weight. The average scores for the six areas of the macro environment in the studied group of health care facilities are shown in Tab. 1.

Based on the research, in the development of a strategy of the surveyed health care facilities, political-legal and technological factors are the most important, while social and cultural factors are of least importance.

Tab. 1. Summary of average assessments attributed to factors that affect a strategy in the studied health care facilities

Specification	Assessment
Political and legal factors	2.0
Economic factors	1.7
Socio-cultural factors	0.6
Technological factors	2.0
Demographical factors	1.2
Epidemiological factors	1.6

Source: own study based on surveys.

Among technological factors, the most relevant to health care facilities are new techniques and diagnostic procedures (the average score of 2.1) and new treatment techniques (the average score of 2.0). Health care institutions wanting to be more competitive have to consider technological factors. The management should be kept abreast of new technologies which have appeared on the market and assess whether they would be useful in the facility and how to obtain them.

From among the political and legal factors, the most important were the of healthcare reform (the average score of 2.7), change in the healthcare policy (the average score of 2.6) and the volatility of regulations and legal norms (the average score of 2.3). It can be noted that these factors pose some threat. In the recent period, we observed the instability of legal regulations, more rigorous rules of contracting and settling health care benefits, as well as limiting them.

Economic factors comprise an important group of factors. The most important for the studied entities were the economic situation (the average score of 2.3), inflation (the average score of 1.9), the distribution of income of the population (the average score of 1.8) and the availability of loans (the average score of 1.8).

Based on these studies, it can be stated that political and legal as well as technological factors, rather than financial factors, have a key influence on the operation of the studied health care facilities, and, therefore, their strategies.

The most important player in the environment of health care facilities is the payer that determine the type and the number of services as well as their price to be contracted with the hospital. And without a contract with the National Health Fund, the hospital would not exist, because the contract provides approx. 95% of the revenue of the entity.

The policy pursued by the National Health Fund had and continues to have a decisive impact on the operation of health care facilities.

As it is clear from the conducted studies, as much as 71.4% of respondents are dissatisfied with the cooperation with the National Health Fund. The most important problems that health care facilities had to face because of the policies adopted and implemented by the National Health Fund, according to managers of the studied health care facilities, were:

- non-payment by the National Health Fund for all the realised benefits, despite a huge financial surplus secured by the Head Office,
- not paying for migration, i.e. benefits realised for residents of other voivodeships,
- the need to reduce admissions and the level of provided benefits,
- increasingly higher requirements of NFZ with the unchanged or even reduced level of funding,
- rules for the performance of agreements related to the central reporting necessitate multiple copying and manual entering of data into the reporting system of the National Health Fund, even though it is nowadays unacceptable for a computer system to function without the possibility of loading data recorded in another system, having in mind millions of zlotys spent each year for computerisation by the National Health Fund.

After conducting strategic analysis, the next stage is to formulate the mission and goals of the organisation based on the analysis.

To implement financial and strategic plans, actions should be taken based on targets defined by health care facilities.

The overall goal of the operation of the health care facility is expressed in its mission. In practice, not all studied health care facilities formulate its mission. Defining the proper mission, adequate to market opportunities, may be an element of competitive advantage in the market of medical services.

The next step is determining goals and objectives, and then defining strategies to achieve and implement them.

The objectives of health care facilities should be short-term, due to the nature of the policies imposed by the National Health Fund.

The studied health care facilities formulated the following goals and objectives in their statutes:

- providing patients with high-quality medical services with full respect for the rights of the patient,
- development of medical activities of health care facilities by extending the scope, increasing the availability and number of provided medical services, particularly outpatient services and short-stay hospitalisations,
- reliable implementation of the terms of the agreement concluded with the National Health Fund,
- maintaining mutual respect and trust with partners,
- ensuring security in the environments of health care facilities by knowingly managed risk,
- efficient and environmentally friendly management of resources,
- providing employees with a safe working environment, conditions for professional development and a sense of belonging and responsibility in the creation of the position and image of the health care facility,
- fulfilling legal requirements.

After analysing the objectives of the surveyed health care facilities, we can conclude that they coincide with the mission.

Goals can be achieved taking required actions and using specific resources. This involves the implementation of the strategy.

The current strategy can have a physical and financial aspect. The resources launched during real processes require financing.

If we consider the financial aspect, from the point of view of the health care facility, whose main objective is to balance costs with revenues and maintain the financial liquidity, the answer to the following questions will be important: 'How to hold out on the market of medical services, how to maintain relative liquidity or how to rationalise costs?' Health care facilities can plan strategic financial objectives, such as the revenue growth, cost reduction, improved efficiency, and better use of resources (Kludacz, 2009).

Based on the study, the strategic financial objectives of the surveyed health care facilities primarily related to the reduction of costs of the entities (64.3% of respondents).

Health care facilities should consider how to translate their strategy into action. The strategic scorecard and the strategy map are helpful tools. Unfortunately, none of the surveyed health care facilities has an implemented strategic scorecard. An analysis of the activities of the surveyed entities demonstrates that health care facilities have elements of strategic scorecards; however, they have not been transformed into a system. There is no comprehensive approach to strategy in the surveyed health care facilities.

Possible improvement of this process should be considered. One should start by building a strategy map that includes strategic objectives placed in four perspectives: financial, patients, processes and development.

The strategy map shows the logic of achieving the primary goal of the organisation, i.e. the mission. Health care facilities are created to serve public pur-

poses and provide services to all or some groups of the society. Therefore, the primary purpose of these entities is to meet the needs of certain groups, rather than generate profit. In the surveyed health care facilities, the perspective of the patient is perceived, because the entities are concerned with the satisfaction of patients and availability of services. These facilities need to think about how to adjust the range of services to local needs and strengthen their reputation. However, to achieve this, facilities will have to improve organisational processes. They will need to improve patient care, the implementation of programmes to enhance the quality and operational efficiency. The study shows that 85.7% of respondents use metrics specific to the perspective of internal processes, such as bed occupancy rate on the average length of stay in the hospital bed.

Other areas are important for the realisation of these goals as well. Since the organisational processes are performed by employees, health care facilities will have to ensure the appropriate level of staff qualifications and its satisfaction. They should also provide support to their employees in the use of information systems that will be helpful in improving the implemented organisational processes.

In all the surveyed health care facilities, the financial perspective is perceived. A typical goal in this perspective is the financial condition. Therefore, the surveyed health care facilities should pay attention both to growth strategies and efficiency strategies.

As it is clear from the research, health care facilities place a greater emphasis on efficiency strategies rather than growth strategies.

4. Discussion of the results

The study shows that the studied health care facilities did not use modern tools helpful in strategic management. It may be because the payer — the National Health Fund — is not a suitable partner enabling to build an appropriate strategy for health care facilities. It would seem that with the ever-changing conditions of the environment, health care facilities should pay attention to modern tools allowing to make more accurate decisions.

According to the undertaken studies, the SWOT analysis is one of the most common tools in strategic management, e.g. in the Netherlands, more than 80% of health managers in hospitals, home care organisations and nursing homes are reported to use the SWOT analysis as part of their strategic process (van Wijngaarden, Scholten & van Wijk, 2012).

Research evidence demonstrates that the improvement of strategic planning practices of hospitals can be effective, but many health care organisations have difficulties in implementing their Strategic Plan to result in successful performance (Zuckerman, 2006; Adams, 2005).

If health care facilities construct strategic plans, it is not a result of the cooperation with the National Health Fund. Most often, health care facilities treat these documents not as a tool in the management of the facility, but as a requirement of various authorities. Consequently, such financial plans are often of low quality.

The National Health Fund poses increasing demands regarding the implementation of various types and ranges of services, constantly changes the rules of operation and cooperation, which do not have any tangible benefits but rather complicate the settlements. Consequently, in such a turbulent environment, the most important focus on the value to the patient thing is lost.

The study shows that mission statements, visions and goals are among the most poorly understood strategic management tools available to organisations. Also, both the hospital's mission and vision statements, as well as clearly defined objectives, are related to the improved performance, staff behaviour, and staff motivation (Bart, 2004).

Healthcare needs to define its own stage four strategic planning qualities. Unique considerations might include the following (Ginter & Swayne, 2006):

- some strategic alternatives available to non-health care organisations may not be realistic for many health care organisations,
- health care organisations have unique cultures that influence the style of and participation in strategic planning,
- health care has always been subject to considerable outside control,
- society and its values place special demands on health care organisations.

The study shows that none of the surveyed health care facilities applies modern tools of strategic management. The use of the Balanced Scorecard in the public sector is shown to be beneficial since it improves and enhances aspects of performance, strategy, alignment, communication, resource allocation, decision-making and competitiveness. The Balanced Scorecard is a tool built to harmonise actions and strategic plans

into a consistent control system. Since the BSC philosophy is to learn from own actions, teamwork and follow up strategy, this tool puts a heavy emphasis on clear communication of objectives and priorities. In short, being flexible and dynamic, the BSC shows what must be done (Cretu, Gheonea & Ivan, 2015).

Conclusions

A decision about the future of a hospital requires confrontation of information about surroundings that determine the possibilities of the hospital, expounded through kept reserves, abilities, and their configurations. Consequently, a strategic analysis is of utmost importance. Due to the carefully conducted strategic analysis, a hospital can define:

- tasks that must be addressed as well as opportunities and threats that emerge in the surrounding environment,
- possibilities arising in the surrounding environment,
- the present and future position in the managed market of health certificates,
- the projected strategy that must be implemented, answering the challenges and flowing the chances arising from its immediate and more distant environment.

In order to operate in a turbulent environment, health care facilities must have the ability to flexibly adapt to changes. In addition, these entities are forced to compete on the basis of principles of a free market economy. Therefore, managers should think in strategic terms. In planning the future of their health care facility, managers must have a range of information about the environment of the entity, its resources, and skills.

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Volume 9 • Issue 2 • 2017

DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 30 December 2016
accepted: 5 June 2017

pages: 90-96

Factors influencing teamwork in health care

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ABSTRACT

The purpose of this paper is to analyse different views on interpersonal relations and team composition among managers and medical professionals with respect to the transition of professional roles in healthcare in Poland.

To achieve that goal, a description based on a quantitative and qualitative questionnaire was conducted. Since the questionnaire covered various areas of health care, only its small fraction was used for the analysis.

The main result is that most of the medical professionals and medical managers consider technology to be the single most important external factor influencing the team work efficiency and team composition in health care, and the managers consider skillset as the crucial factor determining whether a person would be a good team member. Based on the literature on professional roles in health care and their evolution in recent years, one can assume that constant development and lifelong learning would play a significant role in the healthcare systems reform. The findings are an important contribution to the discussion of the healthcare reform and its possible directions in future years as well a reference point for policy makers.

KEY WORDS

health care, professional roles, teamwork, managers and professionals, perspectives

DOI: 10.1515/emj-2017-0018

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Introduction

The determinants of teamwork efficiency have been researched by many scientists. Depending on the perspective, sociology, psychology, management, political sciences or a mix of some of the above are involved. Hence, in most cases, no definitive attribution to a specific discipline can be made. In our paper, we discuss the findings based on an interdisciplinary approach.

The main topic of this paper is how different members of the health care personnel (managers and medical professionals) see teamwork and what factors they consider to be crucial in shaping the professional cooperation. Since by definition determinants are factors that ascertain the nature of a process or

a phenomenon and we do not conduct a quantitative analysis allowing us to draw such sharp conclusions, the rest of the paper will describe only factors in general. The research project that is presented in this paper required a focus on external factors such as legal regulations, new technologies, remuneration system, etc. Because of the amount of literature on teamwork and limited size for the article, we had to draw the line and limit the literature overview to only the most basic sources. Some space is also dedicated to the description of the research project from which this paper originated, namely MUNROS.

1. Literature review

Various aspects of medical health care (e.g. the sociological) are an important issue raised by many Polish experts (Golinowska, Kocot & Sowa, 2008; Rudawska, 2011; Boulhol, 2012). In Polish literature related to the field of medical health care, one of the most significant is the research conducted by Karkowska (2012), widely describing the changes observed in the Polish healthcare system (Kraśniak, 2014). The author emphasises that the generation gap caused the change in opinions on medical professionals. Meanwhile, the same issue is observed by the supranational organisations focusing on the problems related to health care professionals (European Commission, 2008; WHO, 2009). Some papers focus more on defining the crucial factors which determine the sector's ability and readiness for change (Flottorp et al., 2013) or on methods optimising health care management processes (Uziałko & Radosiński, 2009). Some research on human capital management in healthcare continue elaborating on this topic (Wyszkowska & Michalska, 2011; Bodzek, 2011; Hille-Jarząbek, 2011).

At the same time, professional roles in health care are a subject which became increasingly important in recent years (Dubois, 2009; Longpre, 2015). Due to the reform of the healthcare systems in many countries (Han, 2012; Sade, 2012; Shan et al., 2016; Tang, 2013) the professional roles emerge, vanish, merge and evolve in various forms (Bond et al., 2016). The process affects everyone involved in the treatment of a patient: nurses, doctors, managers, physicians, assistants and everyone else in the care pathway (Tsiachristas et al., 2015) which can cause a significant amount of stress (Ramuszewicz et al., 2005). Most of the treatment procedures require the cooperation of two or more members of medical staff, thereby corresponding motivation to work (Zadros, 2011; Kwintowski & Grodzki, 2011). The determinants of the changes in the composition of such teams are important factors one must consider while creating policies for healthcare workforce development. From this perspective, it is crucial to determine which external variables influence a team composition in health care services.

2. Research methods

The aim of this paper is to analyse different views on interpersonal relations and team composition among managers and medical professionals with respect to the transition of professional roles in health care in Poland and compare these perspectives to better understand the possible factors influencing the selection of team members in Polish health services. The research was conducted within the MUNROS project (Health Care Reform: the iMpact on practice, oUtcomes and costs of New roles for health pROfeSsionals), led by the University of Aberdeen. The Management Faculty of the University of Warsaw conducted a part of the research. The project started in September 2012 and is almost complete (as of the end of 2016), and the first partial results are being published and presented at various conferences. The scope of the project is to produce a comprehensive report serving as a basis for policy makers on the EU-level with regard to the new professional roles in health care. The main stages of the project were: an extensive literature review in all 9 countries, a large case-based comparative study (de Bont et al., 2016) and a survey (the questionnaires were developed by all members of the project, under the leadership of the University of Aberdeen) conducted in several hundred care pathways across Europe (324 single care pathways in total).

One of the stages of the project was conducting surveys among medical and medicine-related personnel — Health Care Professionals (HCP) and Health Care Management (HCM). All the questionnaires were distributed and collected between September and December 2015. Three care pathways were studied:

- heart failure/myocardial infarction — HD,
- breast cancer — BC,
- type 2 diabetes — T2D.

The questionnaires were created by the team led by the University of Aberdeen. Afterwards, the questionnaires were adapted by the authors of this paper to the Poland-specific local requirements (including a pilot research in two hospitals) and distributed among 12 Polish hospitals. In each of the hospital, the questionnaires were distributed to patients, HCPs and HCMs — 50 questionnaires per each care pathway, 30/15/5 to each group, respectively.

There were over 1.800 questionnaires distributed in total (sometimes, there were one or two more questionnaires in each pathway) with a return rate of slightly over 50% (907 questionnaires). Such a high return rate was achieved thanks to a direct distribution — a researcher was giving away questionnaires on-site and collecting them afterwards. This procedure not only raised the return rate significantly but also enabled faster data collection. The return rates in subgroups were as follow:

- patients — 58.4% (not covered in this paper),
- professionals — 51.1%,
- managers — 50.0%.

Some of the questionnaires had to be rejected due to:

- incompleteness,
- illegibility,
- lack of any answers.

The total number of observations on Medical Professionals in three pathways was reduced from 283 (returned questionnaires) to 183 in total (breast cancer — 40, heart diseases — 80, type 2 diabetes — 63).

Because of a rather qualitative nature of the research, the sample was put together taking the basic features of the hospitals into consideration: their localisation, size and ownership structure. Half of the hospitals were located in Warsaw and its vicinity and the rest — in various cities across Poland. Apart from these constraints, the main factor in deciding whether the hospital was eligible for the research was the number of care pathways it provided to have the results at least partially comparable to each other and the results that enable the comparison across pathways.

That by no means leads to any representativeness of the results. On the contrary – it was never an intent of the researchers to achieve this. The results can be analysed as a snapshot of selected issues in the present-day Polish healthcare system as perceived by professionals. Hence, no conclusions of a general nature can be drawn, but the observations give a solid starting ground for further research in this area.

3. Research results

The overall questionnaire results of each of the care pathways are shown in the tables below. In the first part the of this chapter, the results of the HCM questionnaires are shown, and then, the results of the survey conducted among HCP are presented as well.

The first table presents the choices of managers of all care pathways regarding factors important in

Tab. 1. Factors important in determining the staff to undertake each task

Factors	Does not influence my choice Degree of impact = 1				Somewhat influences my choice Degree of impact = 2				Influences my choice a lot Degree of impact = 3				Average impact			
	Number of entries				Number of entries				Number of entries							
	HD	BC	T2D	All	HD	BC	T2D	All	HD	BC	T2D	All	HD	BC	T2D	All
Budgetary/cost consideration	1	4	5	10	11	5	4	20	5	2	2	9	2.24	1.82	1.73	1.97
Cost effectiveness	1	2	3	6	8	7	8	23	7	3	8	18	2.38	2.08	2.26	2.26
Experience of staff	1	4	1	6	1	2	3	6	15	11	10	36	2.82	2.41	2.64	2.63
Patient preferences	7	4	4	15	7	5	6	18	2	2	2	6	1.69	1.82	1.83	1.77
Professional influence/opinions	0	0	2	2	14	8	7	29	2	4	3	9	2.13	2.33	2.08	2.18
Regulations	0	1	1	2	9	4	3	16	6	6	8	20	2.40	2.45	2.58	2.47
Skills and competences	0	0	1	1	2	3	1	6	15	9	10	34	2.88	2.75	2.75	2.80
Workforce availability	2	3	2	7	8	5	7	20	7	4	3	14	2.29	2.08	2.08	2.17

Source: authors' elaboration.

determining the staff members to undertake each task.

According to manager declarations, the most important factor determining the choice of medical personnel to be assigned to a specific task was a particular human impact, i.e. skills and competencies as well as staff experience. Regarding breast cancer, the important factors were also regulations, since, for every cancer disease, the Polish lawmakers implemented the so-called 'fast oncologic path', easing the process of the medical care and the overall financing. The following table presents the answers of health care managers regarding the factors being a facilitator or a barrier to changes in the structure of a team of health care professionals, separately for each of the care pathways.

The most important facilitator regarding the changes in the team structure (according to answers of managers) are information technology and medical technology as well as specialist support; whereas the most important barrier is the remuneration system which is closely connected with regulations and legislation factors.

The last table presents the extent to which external factors are driving staff changes for each care pathway as well as for all pathways in total.

Again, according to manager declarations, in all three care pathways, the crucial factor that determined staff change in a team was a broadly defined new technology.

The perspective of the medical professionals was similar. According to the declarations, in all three care pathways, the most important factor that influenced the composition of the medical team was the broadly defined new technology. This was particularly visible in the heart diseases pathway where the spread between the index values was the biggest, as well as the number of observations. This can be attributed to the quick scientific and technological advances in this sphere in Poland in recent years. In the case of Breast Cancer and Type 2 Diabetes pathways, the dispersion of the results was smaller, but the technology was still perceived as the most important factor influencing team composition.

Again unanimously, the least important factor in all three pathways was the remuneration system. This was most visible in case of Breast Cancer pathway, but the differences across and within each pathway as well as the sample were too small to make any significant comments.

The results indicate that the views of the professionals and managers in the Polish healthcare on factors influencing teamwork are to some extent similar. The main external factor influencing the team composition is considered to be the available technology. As pointed out earlier, the simplest explanation of this fact is that the wider availability of new medical technologies shapes the teams. The fact that most managers declare the skills of the staff as an important factor in deciding whether a particular person would be

Tab. 2. Factors facilitating or impeding on changes in the structure of a team of health care professionals

Factors	Facilitator Degree of impact = 3				Neither Degree of impact = 2				Barrier Degree of impact = 1				Average impact			
	Number of entries				Number of entries				Number of entries							
	HD	BC	T2D	All	HD	BC	T2D	All	HD	BC	T2D	All	HD	BC	T2D	All
Information technology	13	9	11	33	2	2	3	7	2	2	1	5	2.65	2.54	2.67	2.62
Management support	12	8	8	28	2	4	5	11	2	1	2	5	2.63	2.54	2.40	2.52
Medical technology	11	8	8	27	5	4	5	14	1	1	2	4	2.59	2.54	2.40	2.51
Professional support	12	9	6	27	3	3	8	14	2	1	1	4	2.59	2.62	2.33	2.51
Experience requirements	8	9	6	23	5	3	7	15	4	1	2	7	2.24	2.62	2.27	2.36
Regulation and legislation	3	2	3	8	6	5	4	15	6	5	8	19	1.80	1.75	1.67	1.74
Staff satisfaction	9	8	9	26	3	1	2	6	5	4	4	13	2.24	2.31	2.33	2.29
Remuneration system	4	2	2	8	2	1	3	6	9	9	9	27	1.67	1.42	1.50	1.54

Source: authors' elaboration.

Tab. 3. Extent of the external factors driving staff changes — all care pathways together (single pathways in parenthesis: HD, BC, T2D)

Factors	Not at all Degree of impact = 1	Not really Degree of impact = 2	Undecided Degree of impact = 3	Somewhat Degree of impact = 4	Very much Degree of impact = 5	Average impact
	Number of entries	Number of entries	Number of entries	Number of entries	Number of entries	
Workforce policies	10 (3/2/5)	4 (2/0/2)	4 (2/2/0)	15 (6/5/4)	12 (4/4/4)	3.33 (3.35/3.69/3.00)
Remuneration system	10 (3/2/5)	5 (2/1/2)	4 (2/1/1)	19 (7/6/6)	7 (3/3/1)	3.18 (3.29/3.54/2.73)
Shifting influences	9 (2/1/6)	10 (5/4/1)	10 (4/3/3)	12 (4/3/5)	4 (2/2/0)	2.82 (2.94/3.08/3.60)
Redesign of health services	4 (1/1/2)	9 (3/3/3)	10 (4/2/4)	14 (4/4/6)	8 (5/3/0)	3.29 (3.53/3.38/2.93)
New technology	1 (0/0/1)	4 (2/1/1)	6 (2/2/2)	24 (7/7/10)	10 (6/3/1)	3.84 (4.00/3.92/3.60)
New legal rights	3 (1/0/2)	8 (4/3/1)	9 (4/2/3)	13 (5/3/5)	12 (3/5/4)	3.51 (3.29/3.77/3.53)
Need for audit trail	7 (1/3/3)	3 (2/0/1)	20 (7/6/7)	13 (6/3/4)	1 (0/1/0)	2.95 (3.13/2.92/2.80)

Source: authors' elaboration.

a team member supports this supposition. They probably refer to the skillset required for operating a specific equipment.

The conclusion is not representative because of the nature of the survey but carries some weight. It points out, that in the foreseeable future, professional education could be an important factor in the team composition process. This statement was supported most of the respondents.

4. Discussion of the results

Considering other studies on the topic of factors influencing teamwork in health care, a starting point for our paper was a wide range of research on teamwork determinants in general. Some specific papers addressed health care in particular, but most of them were merely a literature review without any empirical contribution or simply focusing on the case-study method. The most notable findings suggest that leadership is a crucial factor in shaping the teamwork (Brown et al., 2015). This issue was studied in Poland (Kotas, 2015) but in a rather general manner describing the success factors in social services in general rather than in health care in particular. However, the findings support the ones by Brown, i.e., that leadership is a key factor in determining the success of a team. Other results were obtained while researching the competences of the health care managers. It was concluded that the key factor to the successful work as a manager was the ability to introduce changes (Kraśniak, 2014).

A different approach to the research method is the main difference between conclusions made in the aforementioned papers and this article. MUNROS focuses more on institutional than psychological factors, hence leadership as such was not a subject of research. On the other hand, one can safely assume that after the inclusion of that topic into the questionnaires, leadership could become an important factor influencing teamwork in Polish health care as this is generally true.

In the present state, the paper is an important contribution to the research. Institutional factors play an important role in shaping teamwork in Polish health care and influence the everyday decision-making process to the extent that it cannot be ignored or omitted in the further research. Based on the results, one can assume that constant development and lifelong learning would play a significant role in the healthcare system reform. The findings are an important contribution to the discussion of the healthcare reform and its possible directions in future years as well a reference point for policy makers.

Conclusions

From the practical perspective, the research shows factors that are important for the composition of a health care team, according to medical profes-

sionals and medical managers. The research covered only a selected range of issues; therefore, by no means the authors aspire to give a comprehensive answer as to what influences the team composition process in Poland the most. On the other hand, based on the answers one can safely assume, that professional education plays an important role while considering with whom we would like to work. This emphasises the importance of professional training and the necessity of lifelong learning among the health care professionals. Since most patient treatments are conducted in teams, the lack of professional expertise could potentially make effective work in the professional environment of health care worker impossible. This is additionally supported by answers attributing the team composition change to a broadly defined new technology. Its implementation usually requires a specific and extensive skillset from every person involved in the teamwork, which again stresses the importance of continuous professional training.

The theoretical perspective requires conducting further research on a larger and more representative sample to validate the results and potentially help shape the health care policy.

Acknowledgements

The European Commission funded the research programme Health Care Reform: The iMpact on practice, oUtcomes and cost of New ROles for health profeSsionals (MUNROS), under the European Community's Seventh Framework Programme (FP7 HEALTH-2012-INNOVATION-1) grant agreement number HEALTH-F3-2012-305467EC.

The authors would like to thank all those who created and supported the MUNROS project in all stages: Jan Erik Askildsen, Christine Bond, Antoinette de Bont, Reinhard Busse, Bob Elliott, Sinem Erinç, Job van Exel, Jonathan Gibson, Muhammad Kamrul Islam, Debbie McLaggan, Güldem Ökem, Matteo Ruggeri, Matt Sutton, Hana Svobodova, Apostolos Tsiachristas, František Vlček, Iris Wallenburg and Britta Zander.

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DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 30 October 2016
accepted: 30 May 2017

pages: 97-104

Nurses in Poland — immediate action needed

Józef Haczyński, Zofia Skrzypczak, Małgorzata Winter

ABSTRACT

The aim of the study is to analyse changes in the size of the population of nurses in Poland in the years 2004–2014, considering changes in their employment and the phenomenon of ageing. The analysis is based on the data published by the Central Register of Nurses and Midwives of the Central Statistical Office (GUS) and the Organisation for Economic Co-operation and Development (OECD). Nurses are the largest professional group in the healthcare sector. In 2014, only above 70% of licensed nurses were professionally active. The percentage of employed nurses compared to the number of licensed nurses varied between the lowest ratio of 65.1% in 2005 and the highest ratio of 71.7% in 2012. The latest ratio of 2014 was 70.9%, which was slightly lower compared to the highest ratio in 2012. The average age of a Polish nurse in 2008 was 44.19 years, increasing by about six years to 50.1 within the analysed period. The population of nurses aged above 65 years is almost 4.5 times bigger compared to the youngest age group, which is 21–25 years. Thus, 2/3 of the population of nurses are 41–60 years of age and nearly 85% are over 40. For two years (2000 and 2014), the number of practising nurses per 1000 inhabitants places Poland in the fifth bottom position among the European countries, which shows a significant reduction in patient access to nursing services. In Poland, the profession of nurses has no replacement generation. The article presents the shortage of professionally active nurses in Poland. The existing register of nurses does not contain complete information necessary to evaluate the current situation in Poland. There is a strong need to improve the tracking system of the register of nurses to accurately monitor the number of nurses in Poland The shortage of professionally active nurses and their ageing necessitates immediate action to reduce the shortage by increasing the appeal of the profession among young people and by encouraging nurses to return to the profession. It is also necessary to take action to delay the retirement of those nurses who want to work longer and to use their potential. This is also particularly important because of the gap in experience, which is going to become apparent the nearest future.

KEY WORDS
polish nurses, shortage, ageing

DOI: 10.1515/emj-2017-0019

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Introduction

The ageing population has a significant impact on the long-term care market worldwide influencing the organisation and delivery of health care. Nurses play an important and critical role in the delivery of safe, quality care within the healthcare system. The nursing shortage has been linked to high rates of patient mortality, infections, medication error, and accidents as well as increased length of hospital stay (Liang et al., 2012).

The demand for nursing care will continue to grow because of increasing life expectancy, ageing, the prevalence of severity and diversity of chronic diseases, disabilities and the growth in long-term care and geriatric needs. Growing evidence of nurse supply/demand imbalances is a growing problem world-

wide. In fact, the European Commission has estimated that there will be a shortage of 590 000 nurses by the year 2020 (Sermeus, 2010). This situation is particularly evident in Poland, where due to the increase in the health care needs of ageing societies, the problems of the education system and the immigration of staff, the deficit has been steadily getting worse (Zgliczynski, 2016).

A detailed analysis of the current situation on the nursing labour market, organisation and distribution of work, needs, expectations, motivators at work and frustrations of nurses on the job will allow for better management of currently available resources and the reduction in the numbers exiting the nursing profession. A careful and systematic analysis of projected growth, replacement needs, and education capabilities should provide policymakers with a more complete picture of trends and predictions of the shortage.

The aim of the study is to analyse changes in the size of the population of nurses in Poland in the years 2004–2014, considering changes in their employment and the phenomenon of aging.

1. Literature review

The shortage is created by two major and independent factors: occupational growth and replacement needs. According to the US Bureau of Labor Statistics, by 2022, the fastest growing numbers of new jobs are expected for personal care aides in the first place (580 800 new jobs, increasing by 48.8% compared to 2012) with nurses being the second highest job growth (526 800 new jobs, increasing by 19.4% compared to 2012), and home health aides in the fourth position (424 200 new jobs, increasing by 48.5%) (BLIS report, 2013). Replacement needs are a more significant source of job openings than job growth. Replacement needs are likely to exceed the average in those occupations that employ many women. There are two reasons for this situation: large numbers leave the labour force each year to assume family responsibilities, and a large proportion of older nurses has relatively few years of working life remaining. This calculation shows the scale of the problem: two out of every three job openings must be projected for replacing workers who leave their occupation. An experience gap is another important issue to resolve when hiring new employees to replace the nurses often leaving after many years on duty. Employers need to focus on the fact that it is their responsibility and burden to ensure that new nursing staff can maintain practical skills and expertise. While improved strategies for recruiting health professionals, in part from foreign countries, are needed, major efforts should be directed towards maintaining employed nurses in their jobs for as long as possible (Westendorf, 2007). Migration of health professionals across countries, attracting young people to join the nursing workforce and retention of the existing staff are three possible approaches to tackle current and future nurse shortages (Heinen, 2013). Poland has been dealing with various degrees of nursing frustration and shortage for decades; however, this topic is rarely addressed in scientific publications. On the one hand, the role and importance of professional nursing care in contemporary medicine and health care are increasing due to an impact of ageing population and health problems connected with the rising incidence of chronic diseases and disabilities, which requires more health care services and the related broadening of the scope of nursing care. On the other hand, the perception of the nursing profession as unattractive in terms of financial, long-term professional development opportunities and satisfaction, reducing young people's interest in joining the profession, is linked to the limited capacity of reduced numbers of nursing schools and the ageing nursing workforce (Zgliczynski, 2016). This shortage is on the cusp of becoming a crisis, one with worrying implications for patients and health care providers alike. This is also one of the causes of leaving the profession. There are several reasons for such a situation, which could be categorised into demographic, work-related, and individual-related variables. Top reasons why licensed nurses are not working in nursing are the following: better-paid work in other professions, childcare responsibilities, other family responsibilities, work-related stress, work arrangements e.g. 12 night shifts, and possibilities for an early retirement for those older than 55.

Nurses, being the largest professional group in the healthcare sector, are strongly affected by budget balancing attempts. For many institutions, the easiest and fastest means to balance the books is to cut back the nursing workforce as institutions restructure, downsize, merge or actively shift care from hospitals to communities (Alameddine, 2012). Adequate numbers of qualified and distributed nurses are now one of the most important challenges faced by the Polish healthcare system. A better understanding of factors influencing decisions of nurses, an age structure

analysis, an assessment of the current situation on the nursing labour market in terms of its demand and supply, impact on future decisions to prevent the shortage of nurses. The aim of the study is to analyse changes in the size of the nurse population in Poland in the years 2004–2014, considering, among other things, their employment and ageing.

2. Research methods

The analysis is based on the published data from the following sources:

- Central Register of Nurses and Midwives. It is a source of information about nurses employed in Poland and a collection of personal data specified in the Act on Professions of a Nurse and Midwife. The Central Register is kept by the Polish Chamber of Nurses and Midwives,
- Central Statistical Office (GUS) — Health and health care in 2014,
- Organisation for Economic Co-operation and Development (OECD) — Health at a glance: Europe 2016.

3. Results

3.1. Comparison to other countries in Europe

Human resources are one of the essential elements of the healthcare system. Fig. 1 presents the number of practising nurses per 1000 inhabitants in different European countries for two years (2000 and 2014). Among the presented European countries, the ratio of 5.2 places Poland in the bottom fifth position and shows a significant reduction in the patient access to nursing services. Between 2000 and 2014, a minimal increase in this indicator was recorded, from 5.0 in 2000 to 5.2 in 2014. The average indicator in 28 EU countries was 6.9 in 2000 and increased to 8.4 in 2014.

3.2. The number of licensed and employed nurses in comparison to other health care professions

In this analysed case, it is important to consider both the number of licensed professionals and the number of people actually employed in the Polish health care system (Fig. 2). In 2015, the Central Statistical Office of Poland (GUS) published the most recent available data on professionals working in public and private healthcare institutions and practices, which must report to the Ministry of Health. The data do not include persons for whom the main workplace is the National Health Fund, a university, public administration or a local government authority (GUS, 2015).

According to registers maintained by the Polish Chamber of Nurses and Midwives, the Chamber of Physicians and Dentists, the Pharmaceutical Chamber, and the Chamber of Laboratory Diagnosticians, in 2014, licensure had the following numbers of health care professionals: 141.4 thousands of medical doctors, 40.1 thousands of dentists, 282.5 thousands of nurses, 35.5 thousands of midwives, 31.4 thousands of pharmacists, and 14.7 thousands of laboratory diagnosticians. The number of employees in both

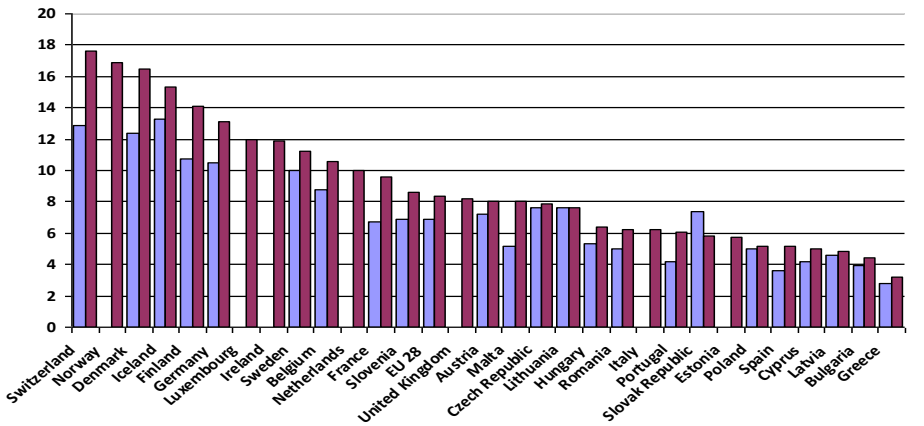

Fig. 1. Practising nurses per 1000 inhabitants in 2000 and 2014 (or the nearest year)

Source: (http://dx.doi.org/10.1787/health-data-en, 12.11.2016).

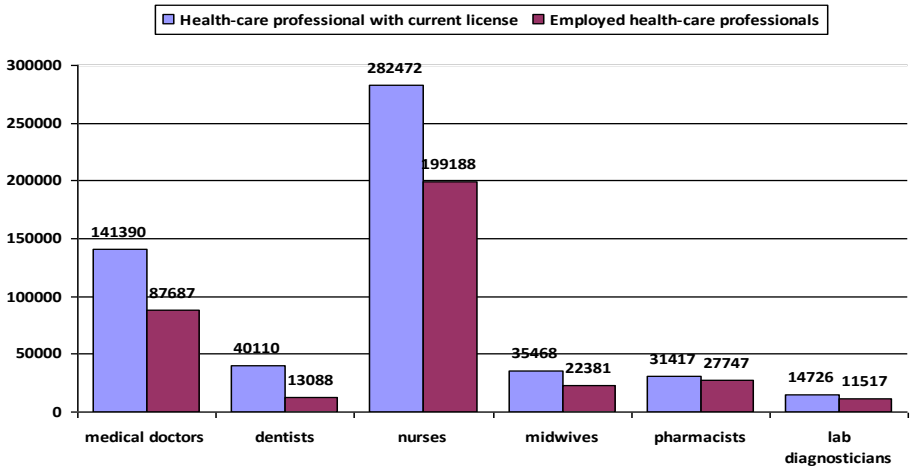

Fig. 2. Numbers of health care professionals with a current license and those employed in public and private health care entities in 2014

Source: (http://stat.gov.pl, 10.11.2016).

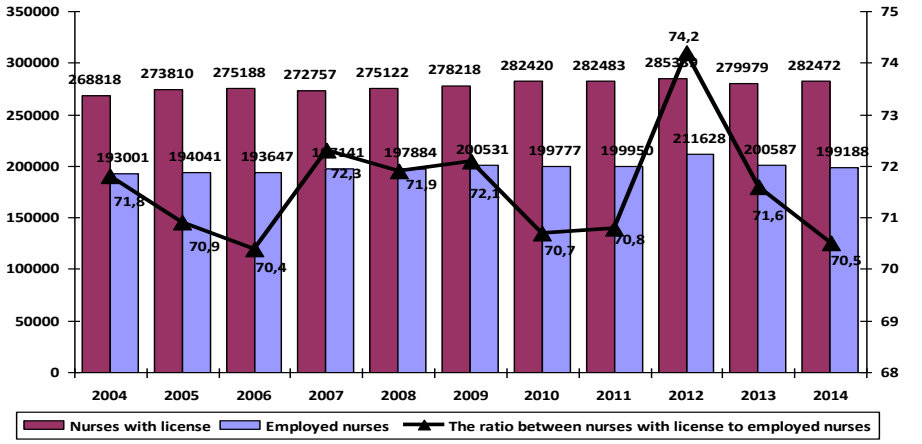

Fig. 3. Number and ratio of nurses with the current license and number of nurses employed in public and private health care entities in 2004–2014

Source: (https://www.csioz.gov.pl/statystyka/biuletyn-statystyczny, 12.11.2016).

private and public healthcare system analyses has shown that in 2014, nurses were still the dominating group of professionals but only above 70% of licensed nurses were professionally active. In 2014, the percentage of the employed among licensed health care specialists in other professions were as follow: 62% of doctors, 33% of dentists, 63% of midwives, 88% of pharmacists, and 78% of laboratory diagnosticians.

Fig. 3 was made to analyse the dynamics and trends of the number and ratio of licensed and employed nurses. The analysis started in 2004, one year before Poland joined the EU.

The percentage of employed nurses compared to the number of licensed nurses varied between the lowest ratio of 65.1% in 2005 and the highest ratio of 71.7% in 2012. The latest ratio of 2014 was 70.9%, which is slightly lower compared to the highest ratio of 2012. After Poland had joined the EU, the immigration of nurses to other EU member states was observed in 2005. The decrease in the ratio between licensed and employed nurses was the lowest in the year of the EU accession and one year after. The unemployment rate of nurses in 2013 was 2.8% (5406 unemployed nurses) and 2.3% (4468 unemployed nurses) in 2014 already.

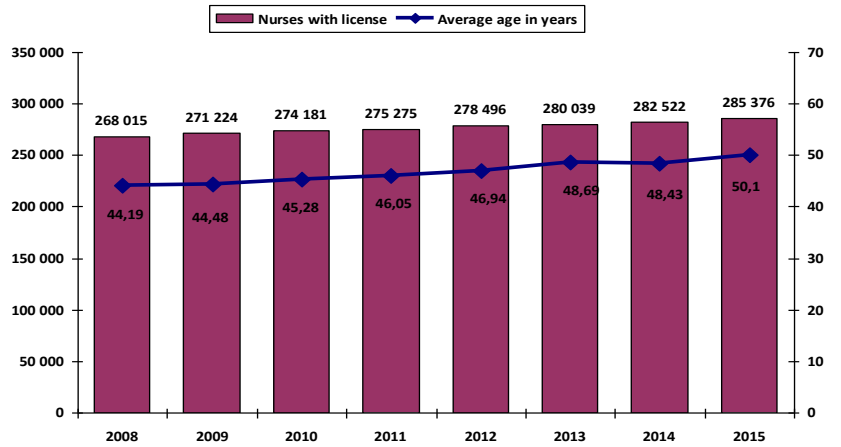

Fig. 4. Number of licensed nurses and the average age in 2008–2015

Source: (www.arch.nipip.pl, 11.11.2016).

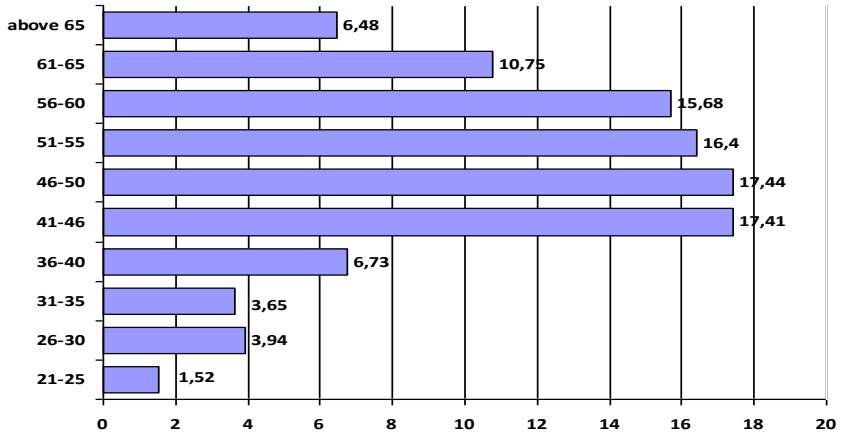

Fig. 5. Age structure of licensed nurses in the Central Register in 2014 [%]

Source: (www.arch.nipip.pl, 11.11.2016).

3.3. Age structure of nurses

The analysis of age in the period between 2008 and 2015 showed the ageing of this profession. The average age of a Polish nurse in 2008 was 44.19 years, increasing by about six years to 50.1 within the analysed period.

The population of nurses aged above 65 is almost 4.5 times bigger compared to the youngest age group of 21–25. This demonstrates the insufficient generation replacement.

The biggest age groups are groups of nurses in their forties: 41–45 years (17.41%) and 46–50 (17.44%), followed by a slightly smaller group of those aged over 50 years: 51–55 years (16.4%) and 56–60 years (25.68%). Thus, 2/3 of the population of nurses are people aged 41–60, and nearly 85% of the population are the nurses over the age of 40. This can, therefore, be used to determine that nurses are a "demographically old professional group".

4. Discussion

Registered nurses with the current license are the largest group of health professionals that provide care in every setting of the healthcare system. The comparison of the number of nurses per 1000 inhabitants in Poland and other European countries shows a significant shortage of professionally active nurses, placing Poland in the fifth bottom position. The dynamics of this indicator were minimally increased within four years. The number of medical doctors with the current license is almost half of the nurses. The analysis of the number of employees

in both private and public healthcare systems has shown that in 2014, nurses were still a dominating group of professionals but only above 70% of licensed nurses were professionally active.

The low rate of unemployment of 2.3–2.8% is caused by economic immigration on the one hand and the natural unemployment on the other, as a result of the lack of jobs in the region, economic reasons, and the restructuration which caused the reduction in the level of nurse employment as well as growing numbers of specialists exiting the profession due to low salaries. Recruiting inactive nurses with an active nursing license but currently not working as nurses or working in non-nursing occupations may be a feasible and cost-effective method, which is used in many countries worldwide, for immediately addressing the nursing shortage (Hsing, 2016). Unfortunately, such efforts are not observed in Poland.

The sources of information about the number of professionals having an active license are the chambers of particular professions collecting information about their members. To obtain the right to practise the nursing profession in Poland after graduating from a university, the graduate must apply in writing. Currently, many young graduates who finish studies and want to work abroad in one of the EU countries do not register in the Polish Chamber of Nurses and Midwives. The difference between the number of nurses with the license and employed nurses emerges due to several reasons such as working in different health care entities outside Poland or leaving the profession for a period shorter than five years. Nurses who have not practised the profession for five years after the graduation or have not worked in the profession for more than five years must undergo special training to maintain the right to practise. Unfortunately, the law does not state the period to be practised by a nurse without interruption not to need the training. The described situation impacted the precise estimation of the number of nurses with the active nursing license who are not currently working in the nursing profession. The dynamics between the number of employed nurses and the number of licensed nurses could be explained by immigration. Most of the older nurses who decided to work in other EU member states maintained their professional license in Poland because of the required confirmation from the Polish Chamber of Nurses and Midwives regarding their education. Now, when the diplomas of nursing schools are widely accepted in the EU, another trend is observed. After completing the education, young nurses no longer apply for their license in Poland but leave the country immediately after the graduation. The dynamics of the number of persons having the actual license to practise is the result not only of the influx of new people who complete education and natural losses associated with the older vintage leaving the job but also the immigration to the Western Europe and emigration mostly from Ukraine and other post-Soviet countries. In recent years, Poland has witnessed a strong rise in medical graduates explained partly by an increasing number of international students choosing Poland to pursue their medical studies; however, most of them leave the country after graduation (Goździak, 2016; Zgliczynski, 2016). According to different data, about 10% of graduates of nursing schools do not work in the profession (Borowiak, 2011). In Poland, low wages of nurses and low pensions are the main reason for immigration and reduced interest in the profession. For young people, limited possibilities of professional development and little difference in salaries depending on years of experience result in the search for different professional opportunities (Marcinowicz, 2016; Skrzypczak, 2016).

Based on the published results of the RN4CAST study (Aiken, 2013), an average Polish nurse working in a hospital is 41 years old, which is among the oldest in Europe together with an average Finnish nurse (42 years old). The Polish result was impacted by the average age of the Polish nurse of almost 48.5 years in 2014, with 2/3 of all nurses being 41–60 years old and nearly 85% of the population over the age of 40. There is a clear insufficiency of generation replacement in this profession.

It is clear that nurses are a demographically old professional group (Zgliczynski, 2016). The further education provided to nurses and midwives after undergraduate studies provides opportunities to continue education at the master's degree level. Many nurses completing the first level of studies decide to continue their education at the master's degree level without undertaking a job in the profession. The current system has prolonged the period of education to 3 or 5 years of studies required for a nurse/midwife to take a job in the profession compared to the previous requirement of two years. So, currently introduced measures aimed at the increase of the numbers of young nurses starting work will bring results in five years. It seems that the shortage of professionals and the gap in experience will become a problem in the nursing profession within a few years in Poland.

According to the data of the survey conducted among nurses and midwives in Łódź, about 70% of participants have at least one additional working place. If nurses/midwives had only one permanent employment, about 30% of health care institutions in Łódź would be unable to provide nursing care according to requirements (Zdziebło, 2006). The picture of the Polish nursing population is very pessimistic. An average Polish nurse is a female over 40, holding at least one additional working place, overloaded and frustrated because of a low salary and the lack of promotion prospects. Immediate action should be taken to improve the situation of Polish nurses and decrease the shortage in this profession. This study has some weaknesses. It was based only on the available registry data and focused on the supply side of the labour market. The authors decided to analyse only the number of nurses, employment, and age structure. These figures could not reflect the full picture of the nursing labour market. To obtain a full picture of the shortage of nurses and the situation on the labour market, additional studies are required.

Conclusions

Nurses are the largest professional group in the healthcare sector. In Poland, one of the lowest numbers of nurses per 1000 inhabitants has been recorded after many years. Only 70% of licensed nurses are employed in health care entities. The average age of a Polish nurse is about 50 years, and nearly 85% of the population are nurses over the age of 40. There is no generation replacement in this profession.

The article presents the of comparison the shortage of professionally active nurses in Poland and other European countries. The most reliable and unfortunately incomplete data regarding the number of nurses come from the register, which does not always contain realistic numbers. There is a strong need to improve the tracking system of the nurses register to accurately monitor the number of nurses in Poland and their employment status.

Because of the shortage and ageing of this profession, it is necessary to take immediate action to reduce the shortage of professionally active nurses by increasing the appeal of this profession for young people and by encouraging nurses to return to their profession. It is also necessary to take action to delay the retirement for those nurses who want to work longer and to use the potential of older nurses. This is particularly important because of the gap in experience, which is going to become especially relevant in the nearest future.

Acknowledgements

The authors have NO affiliations with or involvement in any organisation or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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DE GRUYTER OPEN

ISMSME International Society for Manufacturing, Service and Management Engineering

received: 5 December 2016
accepted: 5 June 2017

pages: 105-115

Key determinants of human resource management in hospitals: stakeholder perspective

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ABSTRACT

Over the past decade, theoretical and empirical research on the various aspects of human resources (HR) within the healthcare (HC) sector has grown extensively due to its' strategic importance in the sector. There is a visible tendency among researchers to pursue an effective human resource management (HRM) strategies, methods, and tools. Countries implement policies which should increase the amount and competences of employees within healthcare. Providers of HC services (i.e. hospitals) tend to enforce modern HRM solutions adapted from business organisations to attract, retain and develop HR. However, these seem not be as effective as they could (Hyde et al., 2013). Because of this, authors approached a researched reality from the point of view of a contextual paradigm, assuming that HRM solutions to be effective should match the reality of HC providers (Pocztowski, 2008). The aim of the research was to detect determinants which might influence the management of medical personnel in hospitals and identify the possible strength of these determinants so a more adjusted organisational and human resource management strategy could be elaborated. The list of possible determinants of hospital operations as the result of meta-analysis was elaborated. The list created the basis for interviews conducted among stakeholders and experts. Respondents were asked to appraise the factors with the usage of numerical scale considering their influence on medical personnel management in hospitals (physicians, nurses and others). In total, there were 28 interviews completed. The general conclusion which can be drawn from the analysis of these data is that hospitals should reorient their HRM practices in such the way that not only the quantitative but also the qualitative aspect of performance would be properly handled. This paper draws from HRM theory (contextual approach), stakeholder theory, and healthcare management theory, adding new insight to each in the context of the HC sector. Identification of most important factors which influence hospitals could allow the providers to elaborate HRM strategy adjusted to external circumstances.

KEY WORDS

organisational environment, human resource management, hospitals, stakeholders

DOI: 10.1515/emj-2017-0020

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Introduction

In the context of changes taking place in the external surroundings of modern organisations — changes that involve the appreciation of the importance of intangible capital occurring in parallel with the depreciation of the importance of tangible capital — the statement that organisations operating on diversified product or service markets should shape the human capital at their disposal so that it might develop into a source attracting and maintaining competitive advantage seems justified. Such a statement particularly pertains to all organisations in which the execution of the personnel function has been neglected and concentrates around the administration of personnel matters as opposed to the effective management of human resources. The group of

precisely such organisations decidedly embraces health care entities, including hospitals.

It is in hospitals that human resource management takes on special meaning. After all, it is there that personnel have a direct impact on the quality and effectiveness of medical services. Obviously, the quantitative aspect of human resource — the number of staff employed in the medical sphere who have the qualifications vital for providing medical services — is not without significance (Chopra et al., 2008). The key importance of human resource in entities providing medical services has also been established in publications of the World Health Organization. The World Health Report for the year 2000 lists human capital as one of three key forms of capital necessary for the provision of medical services. Moreover, actions linked with the shaping of this capital are perceived as key components of the budget for the analysed benefits (World …, 2000, p. 75).

The strategic character of human resource in the process of delivering medical services is also witnessed by the multitude of publications devoted to this form of capital. It may be identified during any overview of literature included in databases such as EBSCO, PROQUEST or the Wiley Online Library. The publications pertain to a very diversified gamut of aspects coupled with human resources. However, most frequently analyse matters involve the influence of human resource on the quality of medical services or the state and structure of human resources in the healthcare sector. The aspect of human resource management in entities of the healthcare sector is also becoming a significant research trend in the research agenda aimed at healthcare management. It is for the first time that matters related to personnel management in entities providing medical services, including hospitals, are coming to the forefront against a backdrop of English–language literature (Borrill et al., 2000; Michie & West, 2004). In the indicated publications, the authors most often concentrate on selected aspects of human resource management, rarely applying a holistic approach to matters tied to the implementation of the personnel function. Analysed questions include human capital as an element of the intellectual capital structure, training policy management, performance appraisal, organisational culture, and remuneration. A dominant number of publications is devoted to HRM relations and performance management of healthcare providers (Harris et al., 2007; Bartram et al., 2007). In Poland, the concept of HRM in the healthcare sector stirred the interest of both researchers and practitioners in the early 2000s. Moreover, this is usually and decidedly discussed in the area of public management as a part of the assumptions behind New Public Management, which postulates the implementation of modern management practices as applied in the private sector to organisations active in the public sector, including hospitals (Frączkiewicz-Wronka, 2009; Frączkiewicz-Wronka & Austen, 2011). It should be stressed that the analysis of literature allows the statement that in Poland, as is the case in world literature, researchers are concentrating on studies into select aspects of HRM, e.g., leadership, organisational culture, HRM units, nursing staff management, and personnel management in public and nonpublic entities of the healthcare sector. The work is primarily aimed at diagnosing the state of implementation of the personnel function in the examined entities (Buchelt, 2007, 2008, 2015; Czajka, 2004; Frączkiewicz-Wronka, 2009; Frączkiewicz-Wronka & Austen-Tyndy, 2009; Jończyk, 2008, 2010). As a consequence of the exploration of chosen issues, there is a visible lack of publications dedicated to strategic human resource management, especially the ones analysing the importance of the human capital possessed by medical personnel employed in hospitals.

However, the identified gap cannot be filled immediately by any single research publication. A set of successive scientific explorations is required. Thus, this paper should be treated as an element in a series of publications devoted to wide-ranging issues of human resource management in hospitals. The aim of the paper is to detect determinants which might influence the management of medical personnel in hospitals. The focus is given to environmental determinants, which arise in a macro-environment. To achieve the aim, a set of diversified aspects is being discussed. Firstly, authors discuss a meaning of environmental factors in human resource management. Secondly, a synthesis of knowledge is made in connection with environmental factors, which might have an impact on human resource management in hospitals. Finally, results of the research are presented and a discussed.

1. Literature review

An explanation of the influence of environmental factors requires a brief explanation of the concept of

human resource management. The term human resource management firstly appeared in the literature in the 80s due to publications by researchers from Michigan State University and Harvard University (Pocztowski, 2008). The main assumption behind the concept was the recognition of human resource as a source for acquiring and sustaining competitive advantage. Furthermore, from the beginning researchers were underlining an interactive character of human resource management practices and an environment of organisations. The interaction was not only exposed by the Harvard Model but also by the Michigan one (Lundy & Cowling, 2000). Researchers pointed out various aims of human resource management, i.e. an increase in the personnel engagement and loyalty, the management of employee performance, an improvement in employee relationships, or the appreciation of team performance. These lead to an organisational performance increase, not only in the financial dimension, but also in the intangible one, i.e. the improvement of an organisational image among customers and actual or potential employees (Schuler & Jackson, 1987; Storey, 2001; Boselie, Paauwe & Richardson, 2003; Armstrong & Taylor, 2016). The main practices constructing HRM are recruitment, job introduction, performance management, employee compensation and, finally, the HR development.

The strategic importance of environmental (external) and contextual (internal)determinants is visibly underlined in publications dedicated to strategic human resource management, especially those concentrated on the strategic analysis which aims towards the creation of an HRM strategy. Researchers underline the fact that properly performed strategic analysis results in better understanding of the organisational environment and context. Furthermore, it allows organisations to elaborate an HRM strategy, which may support them in attracting and retaining employees, especially the 'most wanted ones', i.e. talents. Consequently, the probability for organisations to become successful (i.e. gain a competitive advantage) increases.

The environment of organisations is classified in various ways. The most commonly used classification is the one dividing the environment into the macro environment — i.e. the more distant, also known as the social environment — and the micro environment — the closer surroundings. The macro environment is defined as the set of conditions in which the organisation functions in light of its location in a given country or region (Gierszewska & Romanowska, 2002). Porter (1994) assumes that the macro-environment includes the broader surroundings that influence not only the given organisation but also the whole of the sector to which the organisation belongs. The literature indicates that the macro environment may be assigned two basic qualities. Firstly, as factors making up the macro environment can, to a greater or lesser degree, influence the organisations, including primarily human resource management, while the organisation has little or no influence over the moulding of these factors, this impacts the domain of relations of this environment with the organisation. The second quality of the macro environment of human resource management is the multiplicity of conditions constituting that environment, specifically factors of a technological, economic, legal, demographic, sociocultural, and ecological character (Pocztowski, 2008). Tab. 1 presents an example of the set of factors of the macro environment, which can influence HRM.

The micro-environment is also called the competitive or close environment and is defined in two ways. Firstly, as a set of surroundings made up of entities and organisations that have cooperative or competitive ties with the given economic entity (Żurek, 2001). Secondly, as a set of surroundings made up of current or potential customers, suppliers, competitors, and companies producing substitutes (Porter, 1994). A quality of the competitive environment is that there is feedback between its elements and the company: entities of the competitive environment have an impact on the company, but the company also can actively react to such stimuli. Thus, the nature of mutual relations is that of an economic game. These relations may not only be studied and observed by the company management but also shaped by it (Gierszewska & Romanowska, 2002). In addition, it needs to be underlined that the investigation of the literature visibly leads to the conclusion that environmental and contextual factor and in fact their permanent analysis can support organisations in attaining a success via effective human resource management. The analysis, its' results, allows organisations to 'shape' their HRM processes in such a way that they will be able to avoid threats, use opportunities, eliminate weaknesses and straighten strengths. Perceiving the paper as a part of the series of publications dedicated to various issues of HRM, the further attention is given to factors which are classified into the macro environment.

Tab. 1. Examples of macro-environmental factors influencing HRM

FACTOR CATEGORY	EXAMPLE FACTORS
Technological factors	• state expenditures on research and development • rate of technology transfer • know–how protection
Political factors	• political stability • influence of state officials • attitude of the ruling party on employee–employer relations • European integration
Economic factors	• economic situation • GDP tendencies • inflation rate • unemployment rate • employment costs
Socio–cultural factors	• income differentiation • demographic shifts • natural population growth • lifestyle changes • rural to urban migration • educational level
Labour-market related factors	• accessibility of a qualified workforce • supply of a qualified workforce • demand for a qualified workforce
Legal factors	• labour law • specific legal regulations governing the performance of certain occupations • tax regulations • other legal regulations relating to the realm of worker employment

Source: elaborated by the authors.

1.1. Determinants of human resource management in hospitals

Like all other organisations active in the healthcare sector, hospitals are complex social systems. The character of their operations forces them to guarantee continuity, predictability, and adequate productivity. On the other hand, they need to be flexible, able to adapt to changes in the environment, and innovative. It is for this reason that hospitals must be treated as systems that have the qualities of being both closed and open (Shortell & Kaluzny, 2001; Douglas & Ryman, 2003). Perceiving hospitals as open systems — systems that are a part of their environment — imparts the environment with a special meaning for those managing such units. This is because the environment becomes an integral area of the functioning of the hospital and, as such, should be an object of permanent analyses. This specific relationship between hospitals and their environment also concerns human resource management because it is an inevitable part of daily management practices performed in hospitals. Taking this into consideration, authors performed the literature analysis aimed at detecting factors which might influence HRM in hospitals. The analysis which was performed had a qualitative character. As a result, the list of factors was elaborated and later used during the empirical research (Tab. 2).

2. Research methods

Elaboration of a defined list of factors, such as a lack of physicians and nurses, pressure on hospital performance, altering society and increasing the demand for healthcare services (Tab. 2), allowed researches to include it into the field of healthcare management during semi-structured interviews with hospital stakeholders and experts. The respondents were asked to appraise the factors considering their influence on medical personnel management in hospitals (physicians, nurses, and others). The numerical scale from 1 to 5 was used, where '1' was 'very strong influence', '2' — 'strong influence', '3' — 'small influence', '4' — 'very small influence', and finally '5' — 'minimal influence'. In total, there were 28 interviews completed, lasting from 60–90 min each. Respondents were also asked open-ended questions. The group of respondents was chosen based on the assumption that identification of the key stakeholder needs can help hospitals create an HRM strategy which allows them to compete for financial resources (Eisenhardt, 1988; Eisenhardt, 1989; Marstein, 2003) necessary to attract, retain and develop medical personnel. External stakeholders were interviewed. Furthermore, to get more insights into the characteristics of the hospital environment, healthcare experts were also interviewed.

3. Research results

Considering the aim of the paper, data from the interviews was firstly segregated in the following sequence. First, the respondents were grouped into nine groups:

Tab. 2. List of factors which can influence HRM in hospitals

NO.	FACTOR	LITERATURE SOURCE
1	Aging society resulting in an increase in demand for medical services	Young et al., 2001
2	Growing patient expectations regarding the quality of medical services	Abraham et al., 2011
3	Growing patient expectations regarding the accessibility of medical services	Abraham et al., 2011
4	Greater awareness of patients with respect to medical preventive measures and, therefore, growth in the demand for services supporting prophylactics	Willis et al., 2014
5	Increasing interest of a part of population in matters connected with health and easier access to related information (e.g. via the Internet) causing an increase in the demand for the services	Willis et al., 2014
6	Increasing pressure to lower costs of medical service delivery	Provan, 1987; Kallapur & Eldenburg, 2005
7	Increasing pressure to shorten time of medical service delivery	Provan, 1987
8	Increasing pressure regarding the quality of medical services	Douglas & Ryman, 2003
9	Increasing pressure for the adaptation of patient-oriented health care	Douglas & Ryman, 2003
10	The shortage of public financing in the healthcare system	Martin et al., 2011
11	The shortage of medical personnel	Provan, 1987
12	The depletion of medical personnel from the labour market as a result of emigration	Frąckiewicz-Wronka & Austyn, 2008
13	Organisation and functioning of the medical education system	Chopra et al., 2008
14	Organisation and functioning of the medical post-graduate education system – continued professional training	Chopra et al., 2008
15	The multiplicity and restrictiveness of legal regulations governing the ability to practice a medical profession	Chopra et al., 2008
16	Legal regulations relating to the development of specialised competencies (form and manner of organised training)	Chopra et al., 2008
17	State health policy	Waldau, 2007
18	Advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel	Kimberly & Evanisko, 1981; Saliba et al., 2012
19	Implementation of changes (reforms) in the healthcare system involving commercialisation of medical providers	Klich, 2007

Source: elaborated by the authors.

Note: only examples of papers concerning a certain issue were included in the Tab. 2.

- representatives of educational institutions (2 respondents), the acronym used for the paper —EDU,
- healthcare sector experts (10 respondents), the acronym used for the paper — EXPERT,
- other entity (recruitment company performing its activity in on the healthcare labour market — 1 respondent), the acronym used for the paper — RECRUIT,
- representatives of professional self-governing organisations of medical personnel (5 respondents), the acronym used for the paper — PSO,
- representatives of the Ministry of Health (3 respondents), the acronym used for the paper — MH,
- representatives of the National Health Fund (2 respondents), the acronym used for the paper — NHF,
- representative of the Commissioner for Patient Rights (1 respondent), the acronym used for the paper — P,
- representatives of the local government units (3 respondents), the acronym used for the paper —LGU,
- the chairman of national labour unions of medical personnel (1 respondent), the acronym used for the paper — NLU.

The second activity taken to analyse the data was to replace the name of a factor with an acronym (Tab. 3). Then, the arithmetical mean for each group of respondents was calculated in reference to each factor. Both activities were taken to identify factors which are perceived by respondents as the most important ones. The analysis below (Tab. 4, 5 and 6) concerns particular groups of medical personnel. Furthermore, the aggregated analysis was made to identify the most important factors which should be

considered when planning HRM strategies for hospitals. Factors are perceived as 'important' when the arithmetical mean is smaller than two and pointed out by the majority of respondents.

Considering the data included in Tab. 4, it can be identified that respondents pointed out the following factors as being the most important for management of physicians:

- growing patient expectations regarding the quality of medical services. 7 out of 9 groups of respondents valued the factor below 2;
- the shortage of public financing in the healthcare system. 6 out of 9 groups of respondents valued the factor below 2;
- the shortage of medical personnel. 6 out of 9 groups of respondents valued the factor below 2;
- advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel. 6 out of 9 groups of respondents valued the factor below 2;
- growing patient expectations regarding the accessibility of medical services. 5 out of 9 groups of respondents valued the factor below 2;
- increasing pressure to shorten the time of medical service delivery. 5 out of 9 groups of respondents valued the factor below 2;
- growing patient expectations regarding the accessibility of medical services. 5 out of 9 groups of respondents valued the factor below 2;
- increasing pressure regarding the quality of medical services. 5 out of 9 groups of respondents valued the factor below 2;
- increasing pressure for the adaptation of patient-oriented healthcare. 5 out of 9 groups of respondents valued the factor below 2;
- state health policy. 5 out of 9 groups of respondents valued the factor below 2.

Considering the data presented in Tab. 5, the following factors can be detected as the most important ones when managing nurses in hospitals:

- aging society resulting in an increase in the demand for medical services. 6 out of 9 groups of respondents valued the factor below 2;

Tab. 3. Acronyms for factors used for the analysis

NO.	FACTOR	ACRONYMS
1	Aging society resulting in an increase in the demand for medical services	AGING SOCIETY
2	Growing patient expectations regarding the quality of medical services	PATIENT QUALITY
3	Growing patient expectations regarding the accessibility of medical services	PATIENT ACCESSIBILITY
4	Greater patient awareness of prophylactic measures and an increasing demand for them	PATIENT PROPHYLACTIC
5	Increasing interest of a part of the population in matters connected with health and easier access to related information (e.g., via the Internet) causing an increase in the demand for the services	SYNDROME 'GOOGLE'
6	Increasing pressure to lower the costs of medical service delivery	LOWER COSTS
7	Increasing pressure to shorten the time of medical service delivery	SHORTEN TIME
8	Increasing pressure regarding the quality of medical services	INCREASE QUALITY (CONTRACT)
9	Increasing pressure for the adaptation of patient-oriented health care	PATENT-ORIENTATION
10	The shortage of public financing in the healthcare system	SHORTAGE FINANCING
11	The shortage of medical personnel	HR SHORTAGE
12	Depletion of medical personnel from the labour market as a result emigration	HR INTERNATIONAL MIGRATION
13	Organisation and the functioning of the medical education system	MEDICAL EDU
14	Organisation and the functioning of the medical post-graduate education system — continued professional training	POST-G MED EDU
15	The multiplicity and restrictiveness of legal regulations governing the ability to practice a medical profession	REG PROFESSION
16	Legal regulations relating to the development of specialised competencies (form and manner of organised training)	REG DEVELOPMENT
17	State health policy	HEALTH POLICY
18	Advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel	TECHNOLOGY
19	Implementation of changes (reforms) in the healthcare system involving commercialisation of medical providers	REFORMS

Source: elaborated by the authors.

Tab. 4. Factors which might influence management of physicians

FACTORS	RESPONDENTS								
	EDU	EXPERT	RECRUIT	PSO	MH	NHF	P	LGU	NLU
AGING SOCIETY	2.5	2.3	1	1.7	1.7	1.5	3	2.0	1
PATIENT QUALITY	2	1.3	1	1.0	1.3	1.5	1	2.3	1
PATIENT ACCESSIBILITY	2.5	2.5	1	1.3	1.3	1	2	2.0	1
PATIENT PROPHYLACTIC	2.5	2.9	1	2.3	2.3	3	3	2.7	1
SYNDROME 'GOOGLE'	2.5	2.2	1	2.0	2.0	1.5	2	2.0	1
LOWER COSTS	1	2	1	1.3	2.0	2	1	2.3	3
SHORTEN TIME	1.5	2.2	1	1.7	1.3	1.5	1	3.3	3
INCREASE QUALITY (CONTRACT)	2	2.6	1	1.7	1.3	1.5	1	2.3	1
PATENT-ORIENTATION	1.5	2.5	1	2.3	1.7	2.5	1	2.3	1
SHORTAGE FINANCING	1	2.2	1	1.7	1.7	1.5	2	1.3	1
HR SHORTAGE	1.5	2.1	1	2.0	1.0	1	2	1.7	1
HR INTERNATIONAL MIGRATION	1.5	2.5	1	2.3	2.3	2.5	2	2.3	1
MEDICAL EDU	1.5	2.1	2	2.7	1.3	3	1	3.3	1
POST-G MED EDU	2	2.3	2	2.3	1.3	2.5	2	3.0	2
REG PROFESSION	1.5	2.1	1	2.0	1.7	2.5	2	2.0	2
REG DEVELOPMENT	2	2.7	2	2.0	1.7	2.5	3	2.0	2
HEALTH POLICY	1.5	3.2	1	2.7	2.3	1.5	2	1.7	1
TECHNOLOGY	1	2.2	1	1.7	2.0	1	1	2.0	1
REFORMS	1	2.6	1	2.0	2.0	2	2	2.0	2

Source: elaborated by the authors.

Tab. 5. Factors which might influence management of nurses and midwives

FACTORS	RESPONDENTS								
	EDU	EXPERT	RECRUIT	PSO	MH	NHF	P	LGU	NLU
AGING SOCIETY	1	2.2	1	1	1.3	1.5	2	2	1
PATIENT QUALITY	3.5	1.7	1	1.4	1.3	2.5	2	2.3	1
PATIENT ACCESSIBILITY	2.5	2.7	2	2.6	1.3	2	2	2.7	1
PATIENT PROPHYLACTIC	2.5	3	2	2.6	2.3	3.5	2	3.0	1
SYNDROME 'GOOGLE'	3	2.6	2	2.4	2.7	2.5	3	3.0	1
LOWER COSTS	2	2.5	1	2.2	1.7	2	2	2.0	3
SHORTEN TIME	2	2.6	1	2.2	1.7	1	2	3.0	3
INCREASE QUALITY (CONTRACT)	3.5	2.5	2	2.2	1.3	2	2	1.7	1
PATENT-ORIENTATION	2	2.5	1	2.4	2.0	2.5	1	2.0	1
SHORTAGE FINANCING	1.5	2	1	1.6	2.0	1	2	1.3	1
HR SHORTAGE	1	2	1	1.8	1.0	1	2	2.0	1
HR INTERNATIONAL MIGRATION	1	2.6	1	1.8	2.7	2	3	2.3	1
MEDICAL EDU	2	2.3	2	2.8	1.3	2.5	1	3.3	1
POST-G MED EDU	2	2.9	2	2.6	2.3	3	1	2.7	2
REG PROFESSION	2.5	2.3	1	1.6	1.7	2	2	2.0	2
REG DEVELOPMENT	2	2.9	2	1.8	2.0	3	2	3.0	2
HEALTH POLICY	2.5	3.3	1	2.8	2.7	2	2	2.3	1
TECHNOLOGY	2	2.6	1	1.6	2.3	1.5	1	2.7	1
REFORMS	2	2.7	1	1.8	3.0	2.5	2	2.0	2

Source: elaborated by the authors.

- the shortage of medical personnel. 6 out of 9 groups of respondents valued the factor below 2;
- growing patient expectations regarding the quality of medical services. 5 out of 9 groups of respondents valued the factor below 2;
- the shortage of public financing in the healthcare system. 5 out of 9 groups of respondents valued the factor below 2;
- advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel. 5 out of 9 groups of respondents valued the factor below 2.

Consideration of the data presented in Tab. 6 reveals that respondents do not perceive factors which can be detected in the hospital environment as important when managing other medical staff. This might relate to the amount of the personnel employed in hospitals which is much smaller than in other medical entities. Also, the specifics of health care services require most of the time direct engagement of physicians and nurses into the process of medical service delivery.

Finally, the arithmetical mean was calculated for all medical staff. In the case, respondents pointed out five most important factors which should be considered while managing medical personnel employed by hospitals (Tab. 7). These are:

- aging society resulting in an increase in the demand for medical services. 6 out of 9 groups of respondents valued the factor below 2;
- growing patient expectations regarding the quality of medical services. 6 out of 9 groups of respondents valued the factor below 2;
- the shortage of public financing in the healthcare system. 6 out of 9 groups of respondents valued the factor below 2;
- the shortage of medical personnel. 5 out of 9 groups of respondents valued the factor below 2;
- advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel. 5 out of 9 groups of respondents valued the factor below 2.

Tab. 6. Factors which might influence management of other medical personnel

FACTORS	RESPONDENTS								
	EDU	EXPERT	RECRUIT	PSO	MH	NHF	P	LGU	NLU
AGING SOCIETY	1	2.6	2	2	2.7	2.5	1	2.7	3
PATIENT QUALITY	3.5	2	2	1.8	2.3	3.5	2	2.7	2
PATIENT ACCESSIBILITY	2.5	3	3	3	2.0	3.5	3	3.3	1
PATIENT PROPHYLACTIC	3	3	3	3.2	3.3	4	3	3.7	1
SYNDROME 'GOOGLE'	3	2.8	3	2.8	4.0	3.5	4	3.3	1
LOWER COSTS	2	2.5	1	2.4	3.0	3	4	2.0	3
SHORTEN TIME	2	2.8	2	2.4	3.3	2.5	4	3.3	3
INCREASE QUALITY (CONTRACT)	3.5	2.5	3	2.8	3.0	2.5	4	1.7	1
PATENT-ORIENTATION	2	2.6	1	3	3.3	3	3	2.3	1
SHORTAGE FINANCING	2	2.3	1	2	2.7	1.5	4	1.7	1
HR SHORTAGE	2	2.9	1	2.8	2.3	2	4	3.7	1
HR INTERNATIONAL MIGRATION	2.5	3.5	3	2.6	4.7	4	4	3.7	1
MEDICAL EDU	2.5	2.5	3	3.6	4.0	2.5	2	3.3	1
POST-G MED EDU	3	3.1	3	3.2	4.7	3	3	2.7	2
REG PROFESSION	3	2.3	4	2	3.7	2	4	4.0	2
REG DEVELOPMENT	2.5	3	4	2.2	3.7	4	4	4.3	2
HEALTH POLICY	3	3.3	3	3	4.3	2	3	3.7	1
TECHNOLOGY	3	2.5	2	2.2	4.3	2	3	3.7	1
REFORMS	3	2.7	1	1.8	4.3	3	3	2.7	2

Source: elaborated by the authors.

4. Discussion of the results

Hospitals are key elements of the healthcare systems. Not only because they acquire the larger portion of public finances allocated for health care providers (Eurostat, 2017), but also because they deliver services which cannot be provided by other entities, i.e. the emergency ones (McKee & Healy, 2002). Furthermore, hospitals employ a larger part of medical personnel which is engagement in the healthcare system, especially physicians and nurses (Eurostat, 2016). These unique features of hospitals as organisations inspire researchers to explore them from diversified perspectives. The paper aimed to analyse the macro environment of hospitals to detect factors which might strongly influence the management of staff in general and particular groups, such as physicians, nurses (including midwives), and other medical personnel (i.e. physiotherapists, technicians). For this reason, interviews with stakeholders and health care experts were performed. Respondents were asked to appraise each factor which was detected in the literature using the scale from very important to minimal importance. From the analysis performed in the earliest section, few conclusions can be drawn. First of all, it is visible that respondents believe that environmental factors strongly influence the management of physicians. For the group, the larger number of factors may be detected as important, namely growing patient expectations regarding the quality of medical services, the shortage of public financing in the healthcare system, the shortage of medical personnel, advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel. Secondly, nurses are another group, the management of which might be visibly influenced by environmental factors. The factors which were valued highly by the majority of respondents were the aging society resulting in an increase in the demand for medical services and the shortage of medical personnel. Thirdly, respondents gave a comparatively low score to the influence of the factors on the management of other medical staff.

Conclusions

As a consequence of the research and analysis of the results, there were few instead of many factors

Tab. 7. Aggregated data concerning factors which might influence management of medical personnel

FACTORS	RESPONDENTS								
	EDU	EXPERT	RECRUIT	PSO	MH	NHF	P	LGU	NLU
AGING SOCIETY	1.5	2.4	1.3	1.5	1.9	1.8	2.0	2.2	1.7
PATIENT QUALITY	3.0	1.7	1.3	1.5	1.7	2.5	1.7	2.4	1.3
PATIENT ACCESSIBILITY	2.5	2.7	2.0	2.5	1.6	2.2	2.3	2.7	1.0
PATIENT PROPHYLACTIC	2.7	3.0	2.0	2.8	2.7	3.5	2.7	3.1	1.0
SYNDROME 'GOOGLE'	2.8	2.5	2.0	2.5	2.9	2.5	3.0	2.8	1.0
LOWER COSTS	1.7	2.3	1.0	2.3	2.2	2.3	2.3	2.1	3.0
SHORTEN TIME	1.8	2.5	1.3	2.2	2.1	1.7	2.3	3.2	3.0
INCREASE QUALITY (CONTRACT)	3.0	2.5	2.0	2.3	1.9	2.0	2.3	1.9	1.0
PATENT-ORIENTATION	1.8	2.5	1.0	2.6	2.3	2.7	1.7	2.2	1.0
SHORTAGE FINANCING	1.5	2.2	1.0	1.7	2.1	1.3	2.7	1.4	1.0
HR SHORTAGE	1.5	2.3	1.0	2.2	1.4	1.3	2.7	2.4	1.0
HR INTERNATIONAL MIGRATION	1.7	2.9	1.7	2.1	3.2	2.8	3.0	2.8	1.0
MEDICAL EDU	2.0	2.3	2.3	3.1	2.2	2.7	1.3	3.3	1.0
POST-G MED EDU	2.3	2.8	2.3	2.9	2.8	2.8	2.0	2.8	2.0
REG PROFESSION	2.3	2.2	2.0	1.7	2.3	2.2	2.7	2.7	2.0
REG DEVELOPMENT	2.2	2.9	2.7	1.9	2.4	3.2	3.0	3.1	2.0
HEALTH POLICY	2.3	3.3	1.7	2.9	3.1	1.8	2.3	2.6	1.0
TECHNOLOGY	2.0	2.4	1.3	1.8	2.9	1.5	1.7	2.8	1.0
REFORMS	2.0	2.7	1.0	1.8	3.1	2.5	2.3	2.2	2.0

Source: elaborated by the authors.

detected as important for medical management in hospitals (such as aging society resulting in an increase in the demand for medical services, growing patient expectations regarding the quality of medical services, the shortage of public financing in the healthcare system, the shortage of medical personnel, and advancements in medical technology creating a demand for the continuous development of specialised competencies on the part of medical personnel) are often analysed and researched by academics and practitioners, i.e. international organisations such as WHO or the EU. Nonetheless, these factors are analysed from a macro perspective. There is a visible lack of papers exploring ways hospitals should react towards identified challenges via HRM practices. Referring to HRM literature, it can be pointed out that when such a set of factors evolves in for-profit (private) sector organisations, a set of HRM can be undertaken i.e. organisations build their employer brand to attract and retain employees, competences of employees are developed to deliver high quality products and services, talent management programs are introduced, a larger portion of the budget is dedicated to training, performance management is adapted, etc. Detection of the factors which may influence the personnel management in hospitals, however, gives a chance for hospitals managers to rethink the situation and proactively react to it by adjusting HRM practices to actual environmental conditions. From the theoretical point of view, this paper this paper draws from the HRM theory (contextual approach), stakeholder theory, and healthcare management theory, adding new insight to each in the context of the HC sector. This research gives some insights about the hospital environment and particular factors which might influence medical personnel management within these organisations. However, the conclusions drawn from the analysis are limited due to a qualitative approach to empirical research. Additionally, further research should be undertaken to confirm the first conclusions.

Acknowledgements

This article has been developed within the framework of research project "Human Capital Management in Hospitals", which is financed by the Polish National Science Centre (NCN) as per Decision No. DEC–2013/11/B/HS4/01062.

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