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Infrastruktura techniczna stacji dializ jako element ceny świadczenia zdrowotnego

Streszczenie

Wstęp. Podmiot wykonujący świadczenia zdrowotne w ramach powszechnego ubezpieczenia zdrowotnego zobowiązany jest do posiadania określonej przez prawo infrastruktury technicznej. Tak więc, infrastruktura techniczna jest niezbędnym składnikiem świadczenia. Stan techniczny składników infrastruktury determinuje bezpieczeństwo i jakość wykonywanych świadczeń zdrowotnych.

Cel. Celem pracy było zdefiniowanie wszystkich elementów kosztowych infrastruktury technicznej na bazie modelu przeciętnej stacji dializ w Polsce.

Materiał i metody. W oparciu o dane literaturowe i dane własne uzyskane z 73 stacji dializ należących do grupy Fresenius Nephrocare Polska oraz opracowany wcześniej teoretyczny model stacji hemodializ przedstawiono elementy składowe infrastruktury technicznej stacji dializ w ujęciu kosztowym.

Wyniki. Szczegółowo omówiono składniki kosztów obsługi bieżącej infrastruktury budowlanej i monitorowania stanu technicznego aparatury medycznej. Przedstawiono także źródła finansowania infrastruktury technicznej stacji dializ.

Wnioski. Zmiana zasad finansowania świadczeń zdrowotnych w ramach powszechnego ubezpieczenia zdrowotnego, tak aby obejmowały one wszystkie składniki konieczne do wykonania usługi, w tym niezbędną infrastrukturę techniczną, jest fundamentalną kwestią. Bez niej nie ma szans na reformę ekonomiczną szpitali, niezależnie od formy prawnej ich funkcjonowania.

Słowa kluczowe: stacja dializ, infrastruktura techniczna, cena świadczenia zdrowotnego.

The technical infrastructure of dialysis centres as part of the price of health services

Abstract

Introduction. A healthcare provider, operating in frames of the general healthcare insurance is required by law to have a certain technical infrastructure. Thus, the technical infrastructure is an essential component of a healthcare service. The condition of infrastructure components determines the safety and quality of the healthcare services.

Aim. Definition of all the cost elements of technical infrastructure on the basis of a model of the average Polish dialysis centre

Material and methods. Basing on data from literature and my own data obtained from 73 dialysis centres belonging to the Fresenius Nephrocare Polska Group, and the previously elaborated theoretical model of the haemodialysis centre, I have presented the constituents of the technical infrastructure of a dialysis centre from a cost perspective.

Results. The components of the costs of daily handling the building infrastructure and monitoring the technical condition of medical apparatuses have been discussed in detail. The sources of financing of the technical infrastructure of dialysis centre have also been presented.

Conclusions. Changes in the rules of financing health services under common health insurance, so as to include all of the components necessary to provide the service, including the necessary technical infrastructure, are a matter of fundamental importance. Without it, it will not be possible to carry out an economic reform of hospitals – irrespective of the legal form under which they function.

Keywords: dialysis centre, technical infrastructure, prices of health services.

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INTRODUCTION

The term "infrastructure" is defined as the basic equipment and institutions providing services necessary for the functioning of a sector of the economy and ensuring the appropriate standard of living of the population [1]. With reference to health-care entities defined by the Act on Medical Activity [2], the technical infrastructure comprises buildings, technical equipment and medical apparatuses.

An indispensable organisational precondition for the provision of health services is that the entity providing medical treatment possesses a specific technical infrastructure. Thus, the technical infrastructure constitutes an integral part of the services.

The technical condition of infrastructural components determines the safety and quality of health-care services performed. All elements of the technical infrastructure are subject to wear and tear under usage. For this reason, they require the appropriate counteractive measures in the form of decapitalisation and servicing (current regenerative repairs, periodic overhauls and repairs) [3]. In addition, the development of new medical technologies makes it necessary to constantly modernise the infrastructure and adapt medical entities so that they can provide health services in line with modern medical knowledge.

It should be pointed out that new legal regulations are also appearing, and they dramatically alter the sanitary requirements that must be satisfied by medical entities [4].

As regards the haemodialysis centre, a theoretical model of the dialysis centre has been elaborated that corresponds to an average dialysis centre in Poland. The said model is the point of departure for assessing the necessary investment outlay connected with the creation and maintenance of the technical infrastructure of an extracorporeal dialysis therapy centre [3].

AIM

The objective of the present study is an attempt at a definition of all the cost elements of technical infrastructure on the basis of a model of the average Polish dialysis centre.

I have reviewed the currently valid legal provisions regulating the functioning of haemodialysis centre in order to precisely determine all of the cost elements connected with the functioning of its technical infrastructure. As was mentioned previously, all of the said costs are directly connected with the provision of a health service – haemodialysis. Thus, their correct estimation will directly impact the final valuation of the procedure finances by the National Health Fund under common health insurance, and therefore the functioning of dialysis therapy in Poland as such.

MATERIAL AND METHODS

Legal acts regulating the operations of haemodialysis centres, data from the National Nephrological Register and the National Health Fund, the Register of Healthcare Entities, studies authored by Nefron – Nephrological Section of the Medycyna Polska Economic Chamber, proprietary data of Fresenius Nephrocare Polska, gathered over the past 10 years, including the experience gained from the execution of 73 investment projects consisting in the erection or repair, comprehensive fitting and daily servicing of the technical infrastructure of dialysis centres.

RESULTS

Elements of the technical infrastructure of dialysis centre from a cost perspective

One of the objectives of the present study is an attempt at defining all of the cost elements of technical infrastructure on the basis of a model of the average Polish dialysis centre. The model of the dialysis centre [3] cited in the introduction contains a detailed definition and presentation of the elements of the infrastructure of a dialysis centre from an organisational and functional perspective. The usable area of the model dialysis centre has been estimated as totalling some 600-650 m^2. Table 1 presents infrastructural components from a cost perspective.

TABLE 1. Elements of the infrastructure from a cost perspective.

Fixed assets	Period of usage/ depreciation in months*
Water treatment system	120
Central concentrate distribution system	120
Dialysis machines	60-84
Dialysis chairs	60-84
Dialysis bedside tables	60
Water treatment system with reverse osmosis equipment	120
Treated water distribution loop	120
Double dialysis panels with machine connectors	120
Single dialysis panels with machine connectors	120
Defibrillator	84-96
Electrocardiograph	84-96
Resuscitation set (including a laryngoscope, first-aid kit)	84-96
Cardiac monitor	84-96
Infusion pump	60
Medical manometers	12
Medical chair scales	84-96
Standing medical scales	84-96
Wheelchairs	48
Oxygen system or portable cylinders with dosing valves	
Computer kits	36
Furniture	60-120
Chair for taking blood	60
Refrigerator	84-96

* in PLN

This breakdown does not include one of the most important and cost-generating elements of the technical infrastructure of a dialysis centre, namely rooms (building infrastructure). The construction of a new dialysis centre or adaptation of rooms, necessary in order to bring them in line with the abovementioned formal requirements, is an investment requiring the involvement of considerable financial resources.

It is difficult to elaborate a uniform model of allocation for investment outlay in the costs of the haemodialysis service due to the various forms of ownership of fixed assets. Public dialysis centres have their own buildings (a part of the infrastructure of public hospitals). Due to the age of hospital buildings, the majority of rooms have already been amortised. The majority of non-public dialysis centres rent rooms from public hospitals, and this generates both the cost of subleasing space and the depreciation connected with an investment in a third-party fixed asset, which are settled in accordance with the term of the lease contract. Some non-public dialysis centres have their own buildings or rooms, and in this case the general principles of depreciation – set forward in corporate accounting provisions – are applied.

Irrespective of the form of ownership, a general overhaul of the facility – performed every 5-7 years, or every 10 years at the latest – should be considered as a cost item connected with the functioning of the technical infrastructure of a dialysis centre.

In the past, the presented cost elements of the technical infrastructure have undergone considerable change, both as regards quality and quantity. A typical example of such changes may be the minimum metre requirement per one dialysis stand. Evolution in this regard proceeded in the following order: no requirements, through 12 m^2 [5] and 10 m^2 [6], until the present lack of any surface area requirement. Other functional requirements have appeared – for example access to the patient's bed from 3 sides [4]. This was caused first and foremost by technological progress, as well as by the increased awareness of epidemiological hazards, including haematogenous infections.

Operating and servicing the building infrastructure

Building structures, including buildings and rooms used for conducting medical operations, should be inspected throughout the period of their utilisation. The type and frequency of inspections is determined by the Building Law (Art. 62) [7]. Inspections may be conducted solely by persons holding specific authorisations, e.g. building licences and/or specialist authorisations regarding specific elements of the infrastructure: chimney sweep foremen, specialists in the field of grids, gas systems, electrical systems, etc. The owner, tenant or administrator of building structures should carry out regular technical reviews at their buildings. Some of these periodic inspections are performed once a year, and others once every five years.

During the annual periodic building inspection, the following technical elements of a building are checked: state of the structure and facade, state of rooms, state of systems exposed to the destructive action of factors occurring during usage of the building; for example, in the case of dialysis centres this concerns in particular the water supply and sewage systems, due to the contact with chemically active substances, the technical condition of rooms and equipment for the collection and utilisation of solid wastes, ventilation and chimney ducts, air conditioning equipment, the technical condition of the gas system, and rooms intended for the installation of boilers.

As regards the five-year inspection of the technical condition of the building infrastructure, the following activities are performed: inspection of the technical condition and suitability for usage of the building structure, checking the aesthetics of the building structure, visual inspection of the surroundings of the structure, measurements of the electric and lightning protection systems. The cost elements connected with operation and servicing of the building infrastructure of a dialysis centre have been set forward in Table 2.

TABLE 2. Costs of operating and servicing the building infrastructure of a dialysis centre.

Overhauls and inspections of the infrastructure	
Element/Equipment/System	Frequency of overhauls/inspections
Annual building overhaul	inspected once every 12 months
5-year building overhaul	inspected once every 60 months
Electrical system	measurements every 60 months
Mechanical ventilation	overhaul at least once every 12 months
Air conditioning	overhaul at least once every 12 months
Central heating furnace/Thermal node	overhaul at least once every 12 months
Fire fighting equipment (extinguishers, internal hydrants)	inspected once every 12 months
Fire security instruction	updated once every 24 months
Smoke removal system for stairwells	inspected once every 12 months
Emergency lighting	inspected once every 12 months
Chimney system (if a central heating system is installed)	cleaning once every 6 months
Pressure inspection of fire hoses	inspected once every 60 months
Alarm system	overhaul at least once every 12 months
Lift – technical inspection	inspected once every month
Lift – registration inspection (Office of Technical Supervision)	inspected once every 12 months
Electrical generator (if installed)	inspected once every 12 months

Monitoring the technical condition of medical apparatuses

Pursuant to the provisions of the Act on Medical Devices [8], the entirety of equipment used in the therapeutic process at a dialysis centre should be registered as medical devices. The fact of utilisation of apparatuses registered as medical devices imposes certain duties on users. First and foremost, we have the duty to strictly observe operating instructions – among others as regards repairs, periodic maintenance and equipment inspections. If the manufacturer, being guided by the need to ensure the safety of both the product and patients, has indicated that repairs and maintenance must be performed solely by authorised entities (authorised service centres), the use must satisfy this requirement.

In the case of dialysis centres, where blood is purified in extracorporeal circulation, the complexity of the entire process and the technological advancement of equipment used means that the majority of apparatuses are subject to this obligation. Regular technical and safety inspections are performed by the authorised service centres of manufacturers. At the same time, Article 90 of the abovementioned Act stipulates that the performance provider is obligated to keep documentation relating to repairs, maintenance work, service activities, inspections, adjustments, calibration, and safety checks and inspections performed for any product used in the provision of health services. He is also obligated to keep

in his possession documentation specifying the maintenance schedule, service activities, overhauls, adjustments, calibration, and safety checks and inspections for products used in the provision of health services as per the operating instruction. The minimum frequency of technical inspections and safety checks depends on the type of equipment and the manufacturer, ranging from 2500 operating hours (once every half year) to once every 2 years.

In addition, it should be noted that the majority of medical equipment used at dialysis centres works practically nonstop – the sole periods when it is not used are from Monday to Friday between 23:00 and 06:00, and Sundays. This means that certain activities may be performed only late at night or on Sundays. An additional element concerns the monitoring and registration of system operating parameters – including the daily registration of parameters of the water treatment system and regular inspections of the quality of water supplied to dialysis machines by means of physicochemical tests (once every half year), microbiological tests, and tests determining the presence of endotoxins (once a month) – these tests are required by the National Health Fund [9].

As was mentioned previously, monitoring of the technical condition of medical apparatuses is a precondition, serving to determine the level of safety and the quality of dialysis procedures. Table 3 contains a breakdown of the frequency of overhauls of medical apparatuses and equipment.

TABLE 3. Breakdown of the frequency of overhauls and inspections of medical apparatuses and equipment.

Inspection of medical equipment	
Element/Equipment	Frequency of overhauls/inspections
Haemodialysis machine	inspected once every 12-24 months*
Chair for haemodialysis	inspected once every 12-24 months*
Water treatment system (complete)	documented daily inspections
Reverse osmosis equipment (RO)	inspected once every 12-24 months*
Initial water treatment system – mechanical filters	replaced once every 1-3 months
Initial water treatment system – filtration columns	replacement of filter beds once every 12-24 months
Defibrillator	inspected once every 12 months
Electrocardiograph	inspected once every 12 months
Cardiac monitor	inspected once every 12 months
Infusion pump	inspected once every 12 months
Glucometer	inspected once every 12 months
Scales	legalised once every 24 months
Oxygen dosing unit	inspected once every 12 months
Central concentrate distribution system	inspected once every 24 months
Medical manometers	inspected once every 12-24 months

* depending on the manufacturer

This breakdown does not include the costs of running repairs brought about by equipment failures.

Sources of financing

A separate issue concerns the sources of financing for the technical infrastructure of dialysis centres. In theory, it would appear that the technical infrastructure – which constitutes a necessary element of the service and has been explicitly defined by the National Health Fund – should be a component of the price of the medical procedure that is currently identical for all dialysis centres in Poland. However, this is not the case. In practice, some dialysis centres use additional sources of financing; this concerns mainly public dialysis centres, which avail themselves of grants from their founding bodies – these are public resources obtained directly from taxes. In the final reckoning, haemodialysis performed at subsidised dialysis centres costs the Polish tax payer more than that executed at centres which finance their infrastructure from their own funds. This phenomenon leads to the unequal treatment of entities. This inequality of conditions applies not only to a comparison of the public and non-public sectors, but also in the public sector itself only certain dialysis centres use additional sources of financing, i.e. outside of contracts concluded with the National Health Fund. This leads to a situation where in certain centres it is difficult to determine the share of expenses allocated to the technical infrastructure in the costs of the medical procedure. In the final reckoning, additional financing serves to demotivate the subsidised centres, for they do not strive to optimise the costs of maintaining their technical infrastructure. Apart from oncology and cardiosurgery, renal replacement therapy is the most costly part of the health-care system – not only in Poland, but globally. The level of financing of dialysis therapy in Poland is considerably lower than in other European Union States [10]. On the other hand, the quality of dialysis procedures performed in Poland does not differ considerably from those executed in other European countries. Thus, it would be necessary to perform a detailed analysis indicating the areas in which there is a disparity between the costs included in the calculations of the price of dialysis and the actual costs incurred by service providers. One may put forward the thesis that one of these is the underassessment of the share of the costs of creating and maintaining the technical infrastructure of dialysis centres.

In order to verify this, we should take a closer look at the unit valuation of the dialysis service. The price of the dialysis service, and in particular the part thereof concerning the technical infrastructure, has its historical determinants. The unit price of the dialysis service was determined for the first time in 2000. Sickness Funds in individual provinces have elaborated independent calculations of the price of haemodialysis. Due to the application of different standards and principles of financing, the unit prices of haemodialyses at individual Sickness Funds differed to a considerable degree [11].

In 2000, from 320 PLN at the Podlaska Regional Sickness Fund to 390 PLN at the Mazowiecka Regional Sickness Fund; in 2001, from 349 PLN at the Kujawsko-Pomorska Regional Sickness Fund to 417 PLN at the Mazowiecka Regional Sickness Fund;

In 2002 and 2003, from 364 PLN at the Wielkopolska Regional Sickness Fund (the price of haemodialysis did not include the transport of patients) to 422 PLN at the Mazowiecka Regional Sickness Fund.

As of 1 January 2004, uniform principles of contracting haemodialysis, determined by the National Health Fund, are in force [11]. The financing of separately contracted services

is based on the unit price expressed in settlement points. In accordance with the catalogue of these services, the haemodialysis procedure (including transport and the treatment of anaemia using erythropoietin) has received 37 points, whereas haemodialysis with transport but without erythropoietin – 29 points, with 10 PLN for each settlement point [11]. The unit prices of the procedure were 370 PLN and 290 PLN, respectively. The National Health Fund performed a valuation of the haemodialysis procedure on the basis of consultations and arrangements with medical circles, including the National Consultant for nephrology. It did not, however, conduct an analysis of the costs of providing the performance in accordance with its own medical standards, which should include a separate valuation of all the elements comprising the haemodialysis procedure, among others the procedure itself, transport of the patient, administering erythropoietin, and consultations, which approach the Supreme Chamber of Control viewed as negligent.

The Fund did not present information concerning the methodology applied for the valuation of haemodialysis to the inspecting body. "Available documents do not contain any information regarding algorithms for the objective valuation of procedures connected with the provision of haemodialysis services" [11].

At the beginning we should note that, in principle, a uniform refund rate is in force throughout the country, while the price of the service is determined centrally by the National Health Fund [12]. Although contracts are concluded by provincial branches of the National Health Fund, they do not impact the value of the refund rate.

In 2009, the Medycyna Polska Economic Chamber elaborated a Report on the basis of a survey performed by the Nephrological Section amongst 80 public and non-public dialysis centres. An analysis of data obtained through the survey clearly indicates that there are no significant differences regarding total unit costs of the procedure at public and non-public dialysis centres – the sole difference concerns their structure. As regards the remuneration of personnel, transport, consumables, drugs and laboratory tests, costs are somewhat greater in the public sector. The fundamental divergences concern the costs of infrastructure, i.e. buildings and equipment, the costs of financing operations, and utilities [13].

Similar results were presented by the National Health Fund following a survey conducted in 2010 at some 180 dialysis centres in Poland [13]. The conclusions following from these two studies have not, however, found any reflection in specific actions on the part of the organisers of the Polish healthcare system that would have been aimed at arriving at a uniform system for financing the technical infrastructure of dialysis centres in Poland.

CONCLUSIONS

Legal provisions have usually reflected change post factum, but in numerous instances they have imposed impractical solutions, which over time have been abandoned. In consequence, over the past 10 years the costs of the technical infrastructure have tended to vary considerably. In addition, they were dependent on a number of macroeconomic factors, such as changes in exchange rates, for the majority of medical apparatuses required by dialysis centres is imported.

The financing of haemodialysis under common healthcare insurance was inconsistent as regards the methodological approach. There are no objective studies that would have verified the price of the service for the payer, including the share of the costs of the technical infrastructure of dialysis centres. Without any change of the principle of contracting medical services by the National Health Fund, there is no chance for a reform of the system. First and foremost, this concerns making the prices of services more realistic, so that they include all of the elements required to perform a given medical procedure. The assertion that hospitals have at their disposal a specific and free technical infrastructure that allows them to execute procedures in accordance with the payer's requirements is completely erroneous and unfounded. This infrastructure was not only costly to Polish tax payers in the past, but will also require outlay for its reconstruction and modernisation.

Changing the principles of financing medical services under common healthcare insurance is an issue of fundamental importance, for otherwise there will be no chance of conducting an economic reform of hospitals – irrespective of the legal form under which they function.

Dialysis centres are an ideal model to showcase the opportunities for increasing the efficiency of the system and enhancing its managerial prudence. The model is "pure", because it refers only to "basket" services. Dialysis treatment is financed in whole from common healthcare insurance, without any financial participation on the part of patients [14].

It is therefore necessary to conduct a detailed analysis of the financing of elements of the technical infrastructure on a representative sample of dialysis centres in Poland. Such studies have already been commenced, and currently work is under way on the collection and processing of data.

The presented algorithm for the division of costs on the basis of a model of an average dialysis centres in Poland may prove very helpful in ordering and processing the consolidated data required to determine the share of the costs of the technical infrastructure in the price of the health service. First and foremost, it would give us to opportunity to standardise, and thus to compare the efficiency of management of the technical infrastructure of dialysis centres in various healthcare sectors.

The safety of performance of procedures, which finds reflection in the internal documentation of medical entities that confirms monitoring of the condition of the technical infrastructure, is another important aspect. A new Act on Patients' Rights and the Patients' Ombudsman has been in force since 2008, while provisions governing the pursuit of damages and claims by way of medical events are also changing [15].

The risk of an insurer refusing to effect payment of damages due to the non-fulfilment of obligations provided for in legal provisions, e.g. concerning regular safety inspections of medical apparatuses, has increased greatly. The challenges connected with the functioning and financing of the technical infrastructure of medical entities that are currently faced by healthcare managers following the introduction of new

legal acts do not concern solely dialysis centres, but indeed all elements of hospital infrastructure, as well as other medical entities that are subject to similar regulations

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