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Infrastruktura techniczna stacji dializ jako element świadczenia zdrowotnego

Streszczenie

Wstęp. Niezbędnym warunkiem organizacyjnym udzielania świadczeń zdrowotnych jest posiadanie przez podmiot leczniczy określonej infrastruktury technicznej. Tak więc, infrastruktura techniczna jest integralnym składnikiem świadczenia zdrowotnego – hemodializy.

Cel. Stworzenie spójnego i efektywnego modelu finansowania kosztów rozwoju i utrzymania infrastruktury technicznej podmiotów leczniczych, zwłaszcza stacji dializ.

Material i metody. Przedstawiono tu definicje świadczenia zdrowotnego oraz definicje i składniki infrastruktury technicznej stacji dializ. W oparciu o dane literaturowe oraz na bazie własnych danych uzyskanych z 73 stacji dializ należących do grupy Fresenius Nephrocare Polska stworzono teoretyczny model stacji hemodializ.

Wyniki. Model obejmuje wszystkie składniki infrastruktury technicznej i jest punktem wyjścia do jakościowego i ilościowego zdefiniowania elementów kosztowych niezbędnych do uwzględnienia w kalkulacji ceny świadczenia.

Wnioski. Jakość infrastruktury technicznej podmiotu leczniczego uczestniczącego w międzynarodowej wymianie usług zdrowotnych będzie istotnym elementem przesądzającym o jego pozycji na rynku. Tak więc, zainicjowanie prac nad spójnym i efektywnym modelem finansowania kosztów rozwoju i utrzymania infrastruktury technicznej podmiotów leczniczych w polskim systemie ochrony zdrowia jest koniecznością.

Słowa kluczowe: stacja dializ, infrastruktura techniczna, świadczenie zdrowotne.

The technical infrastructure of dialysis centres as part of health services

Abstract

Introduction. 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 element of health services, including haemodialysis.

Aim. Creating a model of financing the costs of development and maintenance of the technical infrastructure of healthcare providers, especially dialysis centres.

Material and methods. The author has presented a definition of health services and the definitions and components of the technical infrastructure of a dialysis centre. Basing on the literature and her own data obtained from 73 dialysis centres of the Fresenius Nephrocare Polska Group, she has created a theoretical model of the haemodialysis centre.

Results. The model includes all elements of the technical infrastructure and forms the point of departure for a qualitative and quantitative definition of cost elements required in order to take into consideration a calculation of the price of the services.

Conclusions. The quality of the technical infrastructure of the entity providing medical treatment and participating in the international exchange of health services shall constitute an important element, determining its position on the market. Therefore, the commencement of work on a cohesive and efficient model of financing the costs of development and maintenance of the technical infrastructure of entities providing medical treatment in the Polish health care system is an absolute necessity.

Keywords: dialysis centre, technical infrastructure, health services.

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INTRODUCTION

Terminal renal failure requires renal replacement treatment. From amongst the three available methods of renal replacement treatment: transplantation, peritoneal dialysis and haemodialysis, the latter requires a highly specialist technical infrastructure. Haemodialysis is particular due to the fact that the patient avails himself of the services of the haemodialysis centre on a continuous and regular basis over a period of many years.

A description of the services specifies, among others, their scope, organisational requirements, and the expected results of the procedures, that is the medical effects of action.

An indispensable organisational precondition for the provision of health services is the possession of a specific technical infrastructure. Thus, the technical infrastructure constitutes an integral part of the service, i.e. haemodialysis. As regards the haemodialysis centre, this comprises the following elements: rooms (building infrastructure), utility networks and internal distribution systems, as well as medical apparatuses and technical equipment.

Technological development and successive reforms of the health care system have changed the principles of organising and financing medical services. The above mentioned changes have directly impacted detailed solutions concerning the functioning of haemodialysis centres and found their reflection in the relevant legal acts.

AIM

The objective of the present study is to develop a model of the haemodialysis centre that would constitute the point of departure for an assessment of the necessary investment outlay connected with the creation and maintenance of the technical infrastructure of a centre for extracorporeal dialysis therapy.

A review shall be performed of the currently valid legal acts that regulate the functioning of haemodialysis centres. Together with statistical data obtained from national registers and the author's own data, this shall form the basis for an attempt at creating a theoretical model of an extracorporeal dialysis centre, the size of which shall correspond to that of an average Polish dialysis centre.

Individual component elements of the technical infrastructure shall be discussed in detail, so that in future a cost analysis may be performed on this basis.

One of the assumptions of the study is the introduction of greater transparency to the discussion concerning the financing of the technical infrastructure of dialysis centres, which – as an integral part of medical procedure – should be taken into consideration in its valuation.

MATERIAL AND METHODS

Legal acts regulating the functioning of haemodialysis centres, the data from the National Nephrological Register, the Register of Healthcare Entities, the studies authored by Nefron – the Nephrological Section of the Medycyna Polska Economic Chamber, and 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

Definition of the health services

Haemodialysis is a procedure consisting in the extracorporeal purification of the patient's blood. Extracorporeal dialysis therapy in general is performed at specialist centres that are equipped with a dedicated technical infrastructure, including water treatment equipment and dialysis machines. The rooms, systems and equipment that ensure the conditions necessary for treatment in accordance with the current state of knowledge require initial capital outlay, as well as current investment outlay and constant technical supervision. Numerous European dialysis treatment refund models refer to the technical infrastructure and equipment as a condition *sine qua-non*, usually giving a precise definition of their quantitative and qualitative parameters. It is the same in Poland.

Haemodialysis is a medical procedure included in the basket of guaranteed health services [1], allocated service code 5.10.00.0000052. Figure 1 presents the component elements of haemodialysis – a health service falling within Ambulatory Specialist Care (ASC).

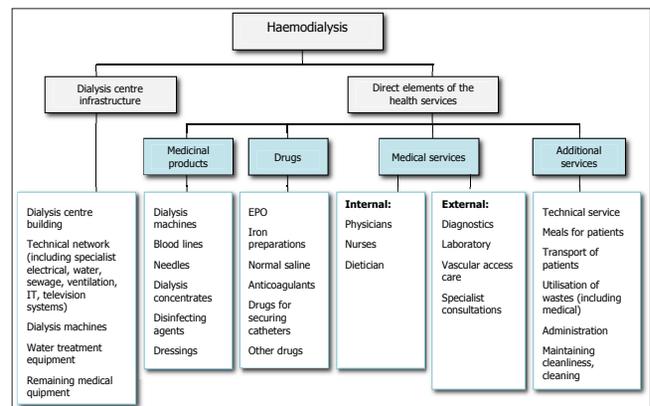


FIGURE 1. Elements of the dialysis service in Poland. Own study.

As it has been mentioned in the introduction, elements of the technical infrastructure of haemodialysis centres include the following: rooms (building infrastructure), utility networks and internal distribution systems, medical apparatus and various types of auxiliary equipment, furniture. Hereunder we have defined and discussed in detail individual elements of the technical infrastructure of dialysis centres. The building or designated rooms, constituting a cohesive organisational whole, constitute an element of the fixed assets of a dialysis centre. Networks and systems. The term „network” is used to describe systems channelling specific utilities – for example electricity and water – to the building of the dialysis centre. The term „system”, in turn, refers to systems distributing utilities within the building – for example the electrical, water, sewage, IT, TV systems [2].

The requirements that should be satisfied by the technical infrastructure of a dialysis centre have been specified in regulations of the Minister of Health [1] and a directive of

the President of the National Health Fund [3]. In accordance with the Regulation of the Minister of Health [4], a registered entity providing medical treatment, which provides dialysis therapy services, must satisfy certain requirements. Inspections are carried out in order to ensure that these conditions are met, among others by Sanepid (Sanitary and Epidemiological Centres) or representatives of the Provincial Centre for Public Health, who pass opinions on entities before they are entered in the register of entities providing medical treatment, which is kept by the territorially competent Provincial Governor. The most important requirements that have to be satisfied by a centre in accordance with the said Regulation shall be discussed hereunder. The shape and area of rooms at an entity providing medical treatment should make possible the correct location, installation and operation of devices, apparatus and machines constituting indispensable functional equipment. Beds in duly fitted rooms should be accessible from three sides, including from the two longer sides. Spaces between beds should enable free access to patients. The width of rooms fitted with beds should allow the removal of each bed. Floors should be made from materials facilitating their washing and disinfection. The connections between walls and floors should be made in such a way as to facilitate their washing and disinfection. The width of doors in rooms through which patients are to be transported should be wide enough as to make transport possible. Rooms fitted with beds should have direct access to daylight. Rooms in which examinations or procedures are performed should be equipped with washbasins with hot and cold water faucets, liquid soap dispensers, dispensers with a disinfecting agent, a container with disposable towels, and a container for used towels. A dialysis centre constituting an independent unit should be equipped at least with the following: dialysis centre together with the necessary supporting rooms and a reception department comprising a cloakroom, reception and registration desk, and WC. In practice, the dialysis centre should be equipped with a group of rooms with centres for haemodialysis, with at least one separate room for the haemodialysis of patients infected with viruses transmitted through the blood, and at least one preparatory room. Another indispensable element of the technical infrastructure of dialysis centre are rooms and equipment for the treatment of water. The nurses' supervisory centre should allow employees to observe patients either directly, or using cameras with an autostart function and provided with a backup power supply, making it possible in particular to observe the faces of patients. At the same time, the infrastructure of a dialysis centre should satisfy the requirements set forward in other legal acts, such as the Building Regulations [5], the Regulation of the Minister of the Infrastructure on the technical requirements that are to be satisfied by buildings and their locations [6], together with the standards cited in the said Regulation, the Regulation of the Minister of Labour and Social Policy on general industrial works safety regulations [7], the Regulation of the Minister of Internal Affairs and Administration on the fire protection of buildings, other building structures and sites [8], the Regulation of the Minister of Health on the detailed method of proceeding with medical wastes [9], and the Regulation of the Minister of Internal Affairs and

Administration on the fire protection of buildings, other building structures and sites of 07.06.2010 [10].

The model of the dialysis centre

In 2011, the population of 17,600 patients were undergoing long-term haemodialysis treatment and 275 dialysis centres were in operation, with the average dialysis centre treating 64 patients [11]. Data obtained from the national register made available for the year 2008 indicates that 14,861 patients were treated at 234 dialysis centres, which gives an average of 63 patients per centre [12]. In 2010, Fresenius Nephrocare Polska treated 5,347 patients at 73 registered dialysis centres, i.e. an average of 73 patients per centre (proprietary data). The presented data shows that in Poland one dialysis centre treats on average some 60-70 patients. The size of the dialysis centre, despite the increase in the number of patients, has remained unchanged. The increasing number of dialysis centres and their gradual decentralisation has resulted in the shortening of the time required by patients to travel to a centre.

If, therefore, we assume that the average dialysis centre treats some 60-70 patients, we may further assume that such a centre requires approx. 15 dialysis centres (taking into consideration the antigen division of patients). The total area of all rooms is about 600-650 m². The configuration of rooms of the model dialysis centre has been presented in Figure 2.

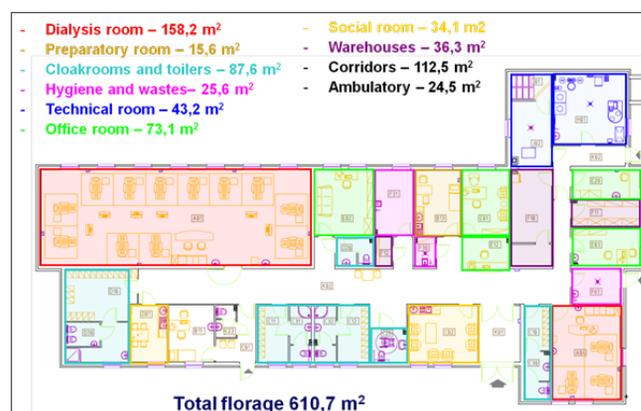


FIGURE 2. Configuration of rooms at the model dialysis centre.

The rooms of the dialysis centre, apart from the standard water, sewage and heating utilities, are equipped with specialist electrical systems that satisfy the requirements imposed by the medical equipment used at the dialysis centre, an extended ventilation system with optional air conditioning, call-out (safety) systems for patients, server and IT network, telephone exchange, and a television system. Depending on the functions which they fulfil, the rooms of the dialysis centre may be divided into four basic groups: rooms used for medical activities, technical rooms, social rooms, and auxiliary rooms. The functional division of rooms has been presented in Table 1.

The presented model takes into consideration all of the above mentioned legal requirements, the epidemiological specificity, i.e. the average percentage of dialysed patients who are infected with jaundice [12] or other infections transmitted through the blood, and state-of-the-art technological solutions. Obviously, individual dialysis centres in Poland differ considerably between themselves. Some of them do

TABLE 1. Functional division of the rooms of the dialysis centre (own data).

Medical rooms	Technical rooms	Social rooms	Auxiliary rooms
<ul style="list-style-type: none"> • General dialysis ward • Dialysis ward for infected patients • Preparatory room • Nephrological clinic 	<ul style="list-style-type: none"> • Room for the treatment of water and preparation of haemodialysis concentrates • Heating centre/ventilation • Technician's rooms • Optional room for the reutilisation of dialysis machines 	<ul style="list-style-type: none"> • Patients' leisure room • Social room for personnel • Cloakroom for personnel with a sanitary centre • Cloakrooms for patients with sanitary centres 	<ul style="list-style-type: none"> • Sanitary room (storage) • Waste storage room • Warehouses • Communication • Remaining office rooms

not satisfy all of the legal requirements, and operate on the basis of adaptation plans that are due to expire at the end of 2016 [4].

It should be noted that the presented model is purely theoretical, and does not constitute a typical technical solution. Individual haemodialysis centre projects differ in terms of the organisational solutions adopted. The presented model is to be used solely to determine the quality and quantity of individual elements of the infrastructure of a dialysis centre.

Medical equipment

Medical equipment is of decisive importance for the functioning of a dialysis centre, for without it the treatment would be impossible. The minimal equipment of a dialysis centre has been set forward in the pertinent regulations of the Minister of Health – on the professional and sanitary requirements that should be satisfied by the rooms and equipment of a health care institution [4], on guaranteed ambulatory specialist care services [1], and in the requirements of the directive of the President of the National Health Fund [3].

The minimum medical equipment that is formally required includes haemodialysis machines with the automatic control of ultrafiltration (also including so-called reserve machines), a water treatment centre, an electrocardiograph, and resuscitation equipment (including a defibrillator). This is not, of course, the complete set of required equipment – it is not possible to perform dialyses without a system for the distribution of treated water to dialysis machines, together with dialysis panels and connection point, while dialysis chairs/beds, medical manometers and wheelchairs are also required. Furthermore, it is definitely recommended to have bedside tables for connecting patients for the procedure, one infusion pump, one cardiac monitor and access to oxygen (in the form of a centralised system or portable cylinders).

A list of the most important medical equipment that the model dialysis centre should have has been presented in Table 2.

Apart from infrastructural elements and medical equipment, the dialysis centre must also have the appropriate furniture. The most important fittings of the model dialysis centre include about 160 elements, including: 9 desks, 12 container boxes, 23 bookshelves, 12 wall cupboards, 20 cloakrooms boxes for personnel, 26 storage boxes for patients, a refrigerator, tables, counters for nurses, drug cabinets, armchairs, chairs, etc.

TABLE 2. The most important equipment at a dialysis centre (own data).

Equipment/System	Number [pieces]
Haemodialysis machines	17
Dialysis chairs	15
Bedside dialysis tables	15
Water treatment system with reverse osmosis equipment	1
Loop for the distribution of treated water	1
Double dialysis panels with machine connection points	7
Single dialysis panels with machine connection points	2
Defibrillator	1
Electrocardiograph	1
Resuscitation kit (a laryngoscope, first-aid kit)	1
Cardiac monitor	1
Infusion pump	1
Medical manometers	17
Medical chair scales	1
Medical standing scales	2
Wheelchairs	3
Oxygen system or portable cylinders with feeders	1

CONCLUSIONS

Following Poland's accession to the European Union, our national health care system has started to participate in the international exchange of medical services. From amongst the large number of legal acts that impact the management of the Polish health care system, particularly noteworthy is the Directive on the use of medical services in the European Union, which will effectively come into force as of 2013 [13]. The Directive is intended to make it easier for citizens of EU Member States to enjoy equal access to health care, both public and non-public, within the European Union.

The entry into force of the Directive will force through changes in the functioning of institutions responsible for the organisation and financing of health services, but first and foremost in the operations of entities providing medical treatment that operate on the territory of our country. These changes will primarily concern a greater share in the international exchange of health services, which will offer new challenges for health care managers. The level of financing of the Polish health care system is considerably below the EU average. Under conditions of direct international competition, pressure will grow to increase the efficiency and quality of treatment [14]. The quality of the technical infrastructure is closely connected to the level of safety of patients and the quality of health services. Thus, the discussion concerning a certain standardisation of services is all the more important. The presented model of the dialysis centre may be used as a point of departure for determining the qualitative components of the technical infrastructure of a dialysis centre, and thus to precise qualitative indices, which – finally – will allow us to specify the share of infrastructural costs in the price of the medical service.

As we have already mentioned, one of the assumptions of the study is the introduction of greater transparency to the discussion concerning the financing of the technical

infrastructure of dialysis centres, which – as an integral part of medical procedure – should be taken into consideration in its valuation.

Investment failures resulting from the lack of funds for developing the technical infrastructure may in the near future have very serious consequences for Polish entities providing medical treatment. The quality of the technical infrastructure of the entity providing medical treatment and participating in the international exchange of health services shall constitute an important element, determining its position on the market. Therefore, the commencement of work on a cohesive and efficient model of financing the costs of development and maintenance of the technical infrastructure of entities providing medical treatment in the Polish health care system is an absolute necessity.

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