Introduction

Public hospitals as public management entities must take into account the requirements of a wide range of stakeholders, most important of whom is the patient. They run medical activities focused on the quality of health services provided and ensure patient safety [Projekt założeń do projektu ustawy…]. This stakeholder is primarily interested in the outcome of the treatment, but the manager of this organization, the hospital management body, contractors, financial institutions, employees and controlling institutions expect information collection consisting of financial and non-financial data. The processed data become useful information, for, among other uses, analysing the level of patient satisfaction, basic economic indicators (including liquidity, the level of indebtedness, profitability and employment status) and the effects of treatment and remaining activities (e.g. training of medical staff). The data are also useful in assessing the performance of tasks by a public hospital set out in
legal provisions [see: Ustawa z dnia 15 kwietnia 2011 r.]. All information enables a comprehensive assessment of the entity’s activities, and therefore an assessment of effectiveness, which means that the organization can apply a holistic approach to measuring the results of medical and other activities¹.

The aim of this article is to present the essence, types and research problems concerning effectiveness in the context of a public hospital. The basis of the study is the analysis of the available literature on the subject. The results will answer the research questions regarding the scope of measurement of hospital performance, the types of efficiency and research problems pertaining to effectiveness.

1. Public hospital as a subject of effectiveness

Public hospital as a health care entity conducts medical activity and provides medical services financed mainly from public funds, which distinguishes this organization from non-public hospitals. The definition of a hospital is included in the act on health care activity – “hospital – a treatment institution, in which a health care entity performs a medical activity in the form of hospital services” [Ustawa z dnia 15 kwietnia 2011 r.]. This entity is primarily aimed at achieving social goals, securing social interest and fulfilling the objectives of state health policy, as well as providing hospital services that are considered to be public tasks in accordance with the principle of ensuring equal access to publicly funded health services [Dercz, Rek, 2012, p. 72]. In the face of these tasks, the measurement of a public hospital performance has a wide range. It concerns the determination of the effects of diagnosis, treatment and rehabilitation, the education of medical staff, the implementation of didactic tasks and scientific research, and also involves the assessment of the financial standing. Therefore, both financial and non-financial information is necessary to assess performance. Results and cost-oriented activities prompt the expression of hospital objectives in the form of final results. This leads to the explanation of what factors contribute to the achievement of the given results and what costs they cause. These issues are considered, among others, as part of the trend of efficiency [Gorynia, 2007, p. 53].

Therefore, it may be assumed that the hospital is an organization the effectiveness of which is assessed by transforming data and the collecting and processing of information including financial information, obtained from ever newer sources to meet the assumed objectives resulting from legal provisions and stakeholder expectations.

¹ The hospital can be a seller of health services, it can also rent out premises.
2. The concept and types of efficiency in relation to a public hospital

Efficiency is most often perceived as a mutual relationship between inputs and outcomes, also considering the optimization of resource allocation (economic efficiency). Effective action refers to the maximization of effects or minimization of inputs and involves the use of various resources with the best combination of organizational outlays to obtain the maximum amount of provided services [Rutkowska, 2013, p. 440]. This general concept of efficiency is aimed at maximizing the result and reducing costs [Rudawska, 2007, pp. 23–24] and is identified with economic efficiency. Within this field, one can distinguish cost-effectiveness, income-based and profit-making [Ćwiąkała-Małys, Nowak, 2009, p. 167]. In the case of a public hospital, to maximize the effects in the situation of a limited possibility to increase another result category – revenues are typical and a frequent solution associated with restructuring is the gradual reduction of costs. When decomposing economic efficiency, it is possible to distinguish between technical and allocation efficiency [Kisielewska, 2008, p. 191; Ziębicki, 2014, p. 19].

Technical efficiency means maximizing output effects using a fixed combination of inputs in terms of their type and number [Färe, Lovell, 1978, pp. 150–162]. Obtaining the maximum number of outputs using input sets ensures this efficiency. This means providing services with limited possibilities from the given input collections. In the assessment of allocation efficiency, it is assumed that if the output is measured by the number of health services, efficiency will be understood as the maximum number of health services provided at the lowest cost. Allocation inefficiency occurs when the cost of providing a certain number of services is reduced by changing the combination of inputs without changing the output. Effects – outputs can be increased by adjusting the combination of input signals without increasing the total cost. The differences between technical and allocation efficiency are presented in Table 1.

| Table 1. Selected differences between allocation and technical efficiency |
|---------------------------------|---------------------------------|
| Allocation efficiency          | Technical efficiency            |
| The aim is to indicate what the combination of health and non-medical goods and services in the economy should be. When analysing it, one can determine what goods and services should be provided in the health care sector | The aim is to indicate which health care resources should be used in the production of health goods and services |
| Maximizing the effect is not only related to the full use of its potential, but also results from the optimal configuration of inputs, considering their prices and technology level | Maximizing the effect is aimed at maximizing the result and reducing costs. Effectiveness is expressed in the form of different relationships of results to inputs. The assessment revolves around the use of financial measures, mainly in the form of indicators referring to various categories of results |
| Refers to delivering effects in the form of goods and services and their distribution in society | Resources are transformed into goods, which are services provided to the patients |

Source: Author’s own study based on Santerre, Neun [2004, p. 5], Kolasa [2012, p. 50], Ziębicki [2014, pp. 19–20].
The estimation of technical efficiency allows us to identify which hospitals provide health services in a way that does not lead to waste, nevertheless, it does not enable a determination of whether the hospital uses the optimal combination of outlays (or effects) from the cost point of view [Łyszczarz, Wyszkowska, 2012, p. 210]. Consideration of effectiveness from a broader perspective enables the analysis and assessment of social efficiency. Effective social activities reflect the quality of society’s life. When carrying them out, the responsibility of the hospital towards the stakeholders is considered [Zbierowski, 2014, p. 11]. The effect is to maximize social benefits obtained at the lowest social cost [Ortún-Rubio, Rodriguez-Artalejo, 1990, pp. 385–388]. A public hospital can, therefore, perform a certain number of health services and contribute to improving patient health, as well as guarantee the increase of social well-being by taking care of the society’s health.

Financial efficiency is another type of efficiency which may be assessed in a public hospital, and is identified with the financial assessment of the organization using traditional accounting measures, market measures (market added value) and cash measures related to cash flows. The assessment of this kind of efficiency in public hospitals is obligatory due to the binding legal regulations [Rozporządzenie Ministra Zdrowia…].

Both financial efficiency and social efficiency can be considered from the point of view of various criteria (Table 2).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Financial efficiency</th>
<th>Social efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity</td>
<td>Public hospital or smaller organizational unit, e.g. clinic or ward</td>
<td>Patient population, society</td>
</tr>
<tr>
<td>The scope of information for stakeholders</td>
<td>Based on financial reporting and financial documentation of the hospital</td>
<td>Based on reporting and documentation decent with the principles of health and social policy of the country</td>
</tr>
<tr>
<td>Measures</td>
<td>Indicators: net profitability, profitability of operations, financial liquidity, ROI productivity, receivables turnover, liability turnover, inventory turnover, debt level, etc.</td>
<td>Indicators: number of new branches, number of treatment entities, investment growth rate, increase in the activation of patients’ families</td>
</tr>
<tr>
<td>Key principles (examples):</td>
<td>Maintaining a proper relationship between inputs and effects expressed in value, valuable measurement of effects</td>
<td>Measurement of non-financial effects, activation of patients’ families in health care, guarantee of patient safety, equal opportunities for patients, non-discrimination of patients</td>
</tr>
</tbody>
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Source: Author’s own study based on Plonka [2008, p. 30].

The criteria presented in Table 2 determine the need to assess effectiveness in a multi-criteria manner. It should be considered why and for whom these evaluations are performed. For stakeholders who require more information about a public hospital, not only the results of measuring financial effectiveness but also those of social efficiency will matter. It should be emphasized that it is difficult to measure this second type of efficiency due to the limited availability of reliable data [Cyfert, Krzakiewicz, 2009;...
Zbierowski, 2014]. In the assessment of this efficiency, reports are used, for example, on the health status of patients, which are published with a certain delay.

In management studies, considerable attention is devoted to organizational efficiency associated with the assessment of the organizational function. It is defined, among others, as a positive result and the degree of goal fulfillment, as well as the relationship of results and costs. Organizational efficiency is presented in the form of multidimensional criteria regarding various attributes of the organization [Ziębicki, 2014, p. 10]. It expresses the organization’s ability to adapt to changes in the environment in a current and strategic way and to productively use its resources to achieve planned goals [Dudycz, Osbert-Pociecha, 2010, pp. 337–338; Skrzypek, 2013, pp. 167–178]. Its measurement is particularly important for a public hospital because, following changes in the environment, it is forced to use the resources productively to achieve the set goals related mainly to the curative activity. This type of efficiency is equated with the concept of effectiveness, where neither the cost of achieving the goal nor the economic effect is significant [Kotarbiński, 1959, p. 131; Pszczołowski, 1977, p. 12]. For this reason, the effectiveness measurement seems to be more adequate than efficiency, in relation to a public hospital [e.g. Helms, 2006, p. 211; Michaleczyk, 2006].

The choice of the presented types of effectiveness results from the fairly frequent analysis of these types of concept in relation to a public hospital. This is the result of the diversity of areas subject to evaluation, the existence of many effects and, at the same time, the expectations of various stakeholders: society, owners, managerial staff, people employed in this institution and patients. Hence, one can distinguish specific efficiency problems that researchers are occupied with.

### 3. Research problems of the efficiency of a public hospital

Among the many research problems, the issue and, at the same time, the difficulty of assessing effectiveness can be distinguished. This results from the different interpretation of this concept and, therefore, the impossibility of adopting uniform measures to estimate it [Skrzypek, 2002, Głowdiński 2015, Bratnicki, Frączkiewicz-Wronka, 2006, pp. 17–32, Frączkiewicz-Wronka, 2010, pp. 5–24, Łyszczarz, Wyszkowska, 2012]. Literature analysis allows us to indicate the reasons for this state of affairs. One of these is the multiplicity of synonyms in literature. Efficiency is identified with efficiency, effectiveness, economy and rationality. The use of measuring tools is also different [Bielski, 2002, pp. 54–66; Skrzypek, 2002; Ziębicki, 2014, pp. 21–22]. Research problems related to efficiency are presented in Table 3.

Efficiency assessment is conducted by using three methods: cost and effectiveness analysis, cost and utility analysis, and cost-benefit analysis.

There have been many studies on the issue of effectiveness. Particular attention is required to identify and analyse the efficiency barriers that have been included [Holly, Suchecka, 2009, pp. 17–20]: the limited rationality of hospitals due to the
lack of rationality in the environment of these entities, limited resources, formalities – legal and organizational, frequent changes in legal regulations, problems in spending funds, and problems in management. Barrier analysis becomes helpful in revealing areas of inefficiency to which the measurement system should be adjusted.

Table 3. Selected problems of efficiency in the context of the operation of a public hospital

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<thead>
<tr>
<th>Author</th>
<th>Problem</th>
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<tr>
<td>Dyduch, Bratnicki [2016, p. 71], Lisiecka [2012, p. 255]</td>
<td>Comparing efficiency with value creation; efficiency as a dynamic, developmental process and concerning many areas of the organization's activity</td>
</tr>
<tr>
<td>Łyszczarz [2006, p. 18], Cooper et al. [2004]</td>
<td>Creating an efficiency model in an organization</td>
</tr>
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</table>

Source: Author’s own study based on selected items of the subject literature.

Another problem is defining the scope of effectiveness (health care system, public hospital, medical and non-medical activities, process). The assessment should consider internal factors that affect the physical components of the health service and its availability, and external factors related to the person receiving the services – the patient (e.g. previous experience, individual needs and customs), institutional environment and socioeconomic factors – and the demographic factors [Krot, 2008, p. 69]. The assessment of effectiveness is related to the adoption of a specific measurement system, considering the complexity of the organization and elements describing both the effects and processes [Lisiecka, 2012, p. 257]. Multi-criteria and multidimensional assessment requires the consideration of a number of criteria, which can include: maximization of production, minimization of costs by technology, optimal use of resources, work efficiency, effective information processing, internal coherence, consistency of structure and strategy reflected in organizational growth, or the maximization of labour productivity [Galama, Kapteyn, 2011, pp. 1044–1056; Kowal, 2013, p. 14; Ziębicki, 2014, pp. 33–37].

Another research problem is the selection of methods for measuring efficiency and concepts supporting measurement. The methods used in public hospitals are Data Envelopment Analysis (DEA) [Charmes et al., 1978, pp. 429–444; Nojszewska, 2012, p. 24; Kujawska, 2013, p. 148] and Multi-Criteria Decision Analysis (MCDA) [Ortyl, Jacyna, 2017]. They enable the assessment of various types of activities undertaken by hospitals [Smith et al., 2008; Szuwarzyński, 2009, pp. 113–129; Kozuź-Cieślak,
2011]. In terms of effectiveness assessment, concepts are also used (including results management, balanced scorecard, value management of the organization, organizational excellence models, and the benchmarking of results). The need for efficiency assessment results from the fact that organizations pay more attention to making such an assessment, due to the need to measure the results of key organizational areas – quality management and customer satisfaction – and also the use of financial and non-financial measures [Ziębicki, 2014, pp. 51–52].

Conclusions

Based on the considerations above, it can be stated that the assessment of hospital efficiency is based on the adoption of a specific category of effects and corresponding measures due to the variety of activities performed by a public hospital. The performance measurement system should be multi-dimensional and give the opportunity to compare the results of the effectiveness of given areas of the public hospital with other entities operating in the same industry. Diversity in determining effectiveness, difficulty in defining inputs and effects, and constructing the measurement system are all factors that make us consider timeless and universal research problems that appear frequently in the literature: the issue of measuring effective and ineffective actions, defining efficiency barriers, and the methods and concepts of measuring aids. By defining these, it may be possible to analyse the areas of a public hospital that can be improved. Both the content and scope of effectiveness change under the influence of the development of theory and practice and the conditions of public hospital activity. Therefore, the criteria for assessing effectiveness should be constantly analysed. In light of this, creating a database of information useful in management and building a system for measuring the results of public hospitals should become a priority.

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Efektywność szpitala publicznego – rozważania o istocie i problemach badawczych

Interesariusze szpitali publicznych są zainteresowani przede wszystkim wynikami leczenia, ale kierownik organizacji, organ zarządzający szpitalem, kontrahenci, instytucje finansowe, pracownicy i instytucje kontrolne oczekują zbiorów informacji obejmujących dane finansowe i niefinansowe. Przetworzone dane stają się użytecznymi informacjami, wykorzystywanymi m.in. do analizy poziomu zadowolenia pacjentów, podstawowych wskaźników ekonomicznych oraz efektów leczenia i pozostałych działań. Dane są przydatne również w ocenie wykonywania zadań przez szpital publiczny. Wszystkie informacje umożliwiają kompleksową ocenę działalności jednostki, a tym samym ocenę jej skuteczności, co oznacza, że organizacja może zastosować holistyczne podejście do pomiaru wyników działań medycznych i innych.

Celem artykułu było przedstawienie istoty, rodzajów i problemów badawczych efektywności publicznego szpitala. Do jego osiągnięcia wykorzystano krytyczny przegląd literatury. W opracowaniu...
opisano także koncepcję efektywności i wskazano jej typy. Wyniki badań dostarczyły odpowiedzi na pytania badawcze dotyczące: zakresu pomiaru efektywności szpitala, rodzajów efektywności oraz badań nad efektywnością.

**Efficiency of Public Hospitals – Considerations of the Essence and Research Problems**

Stakeholders of public hospitals are primarily interested in the outcome of treatments, but the manager of the organization, the hospital management body, contractors, financial institutions, employees and controlling institutions expect information collection consisting of financial and non-financial data. The processed data become useful information for, among other uses, analysing the level of patient satisfaction, basic economic indicators and the effects of treatment and remaining activities. The data are also useful in assessing the performance of tasks by a public hospital. All information enables a comprehensive assessment of the entity’s activities, and therefore an assessment of its effectiveness, which means that the organization can apply a holistic approach to measuring the results of medical and other activities.

The aim of the article was to present the essence, types and research problems of the efficiency of a public hospital. One of the research methods used in the paper was the critical literature review. The article describes the concept of effectiveness and indicates its types. The results of the research provide answers to research questions concerning: the scope of measurement of hospital performance, the types of efficiency and efficiency research.