# QUALITY INDICATORS IN THE HEALTHCARE

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**Abstract**

*In recent decades, quality management has been receiving significant attention in the operation of healthcare institutions as there is an ever increasing pressure on healthcare systems to establish, manage and improve proper quality management systems. Creating and using quality indicators contribute to the improvement of the operation of the healthcare system and to the development of the quality of healthcare services.*

*Due to unfavorable demographic trends, poor health status of the whole population and narrow financial circumstances the healthcare system is facing with serious problems to which special attention must be paid.*

*However, the range of manageable indicators is getting wider, only a few have the real capability to measure and evaluate some dimensions of healthcare quality. The aim of this paper is to give a brief overview of those indicators that are utilized particularly for quality measurement purposes in healthcare services. A special focus is paid to the indicators applied in the rehabilitation of musculoskeletal diseases representing a worldwide growing general health problem. Another objective of the paper is to evaluate the bed occupancy indicator used in Hungarian healthcare institutions and compare it to accepted international standards.*

*Keywords: quality management, indicators, bed occupancy, musculoskeletal diseases*

## Introduction

Over the past few decades health professionals, managers, policymakers and financers pay increasing attention to quality issues and to the applicable tools and methods of quality management in healthcare. Due to the growing awareness and to the increasing public pressure there is clear evidence that quality remains a serious concern in healthcare. In the European Union more and more resources have been invested in applying and improving the methods of quality management in healthcare. Quality development in this field is of vital importance, there is an ever increasing pressure on healthcare systems to deal with the quality of its services.

In a quality development project (the National Demonstration Project on Quality Improvement in Health Care, 1990) Berwick and Roessner (1990) highlighted that the quality improvement methods and tools applied in the industry can also be used in the field of the healthcare for quality development purposes.

Indicators (e.g. demographic data and indexes of cultural-economic factors, indexes of healthcare services and general health state of the populace) are widely used measures in healthcare. They are continually being developed and put into use in various areas. Despite the high number of different indicators only a small percentage of them is applied in healthcare for the measurement and evaluation of quality.

## 1. Definition of quality and its components in healthcare

The starting point to improve quality and outcomes in health systems is the understanding of what is meant by 'quality'. There are many definitions of quality used both in relation to healthcare and health systems and other spheres of healthcare activity. Numerous respected professionals, professors and institutions have studied and defined healthcare quality (e.g. Donabedian 1988; Lohr, K.N 1990; Boján and Belicza, 1995; Belicza and Zékány 1998). For the purposes of this paper, a working definition is needed to characterize quality in healthcare and health systems. Quality is the level at which the expressed and unexpressed needs of all stakeholders of healthcare can be quantified and demonstrated with the primary objective of maximum preservation, restoration and conservation of health taking into account all scientific knowledge, the available resources, and the expected gains and risks as well. An important note must be added: the different participants and stakeholders of healthcare define quality differently. Along with the primary task – giving care – efforts need to be made to meet the needs and expectations of patients, healthcare workers, financers, and other participants too. (Dénes, 2015a) The various opinions and different emphasis placed on the aspects lead to conflicts during the procedure of the quality development which is a great challenge and improving potential for quality management (Gődény, 2007). Moreover, it is necessary to call for continuous improvement since the changing needs of "customer" in healthcare can only be understood and met with this kind of attitude.

Donabedian (1988) defined the components of the quality, which lays the foundation for quality measurement in the field of healthcare services. These quality components are effectiveness, efficiency, accessibility, security, equality and conformity. Maxwell classified one more component of quality, it is compliance (Maxwell, 1992).

The Quality Working Group of the World Health Organization defines four other components of quality (WHO, 1989): efficiency (technical quality), resource utilization (economic efficiency), risk management (the injury, harm, disease caused by the service and prevention or diagnosis of the disease) and the satisfaction of the patient (customer).

## 2. Quality indicators

Indicators are widely used measures in healthcare. A quality indicator is an index number that is designed to represent past and present events numerically in order to measure and evaluate quality. These quality indicators are commonly used to assess the level of the care given, the health state of patients, the changes in health state, the satisfaction of concerned parties and the use of provided subvention.

It is important to note here that an indicator – even one of quality – is not able to provide solution to a specific problem nor to the course of necessary development either. They indicate variances, highlight areas where deeper study or analysis is needed. When indicators are used, it is also necessary to set *a priori* a certain threshold value according to which differences can be evaluated. (Dénes, 2015a)

The use of quality indicators in healthcare is illustrated in Figure 1.

Availability of data is essential when forming healthcare indicators, so the first step is always gathering data from a wider, easily accessible base like administrative data, patient documentation and data gathered through surveys and aimed studies. Administrative data are continuously and regularly collected with the advantage of their cheapness and availability. Quality goals do not affect their content, they are usually case level and relate to all events. The disadvantage of their use is that their content serves the original collection goals.

Patient documentations (hospital charts, surgery records, etc.) are records that are created in relation to the care of patients whenever healthcare services are rendered. In Hungary, they are usually not available electronically. Their advantage is that the quality of their content is not affected by the data collection objectives. Their disadvantage is the fact that they are mostly paper-based (which means that further data-collection needs to take place to extract information, which can be time and money consuming). During the secondary data collection, information can get distorted. A further disadvantage can be the potential lack of data elements necessary for the adequate assessment of the indicator.

Those surveys, aimed studies and data collection, which are carried out based on a protocol designed specifically for the purposes of forming an indicator, can be planned and scheduled, all necessary data elements can be gathered and the data collection serves unique purposes. However, such a process can be very expensive, and the content of the data can be affected by the collection goals, thus data can be manipulated. Aimed studies and data collection can be carried out only periodically (similarly to documentation-based secondary data-collection), so it can not provide continuous feedback on the quality of services. It is also usually difficult to achieve a fair and correct data provision by all parties concerned.

There are a number of ways and practices of forming healthcare indicators and the use of collected data: primary events (sentinel), rate-based indexes, averages.

Forming an *event indicator* is perhaps the easiest among them, but they provide less information, thus are rarely used. Though, they can not be neglected, because they can focus attention to significant cases that demand deeper study or analysis (e.g. death in the rehab department; number of falls; etc.).

*Rate-based indicators* usually show the frequency of an event in percentage (e.g. (deaths following a surgery / number of all patients that have undergone such surgery) · 100; (number of complications / number of all patients) · 100).

*Average value indicators* are usually connected to certain time periods. However, averages can only characterize a given activity if the base data follow normal distribution. In other cases an average value indicator can be seriously misleading. In case of variables that do not follow normal distribution it is necessary to establish a “desired value”, and then calculating the percentage of events not meeting that value can be advantageous.

The establishment and assessment of an indicator should be efficient, which means that the realized (realizable) quality development advantages should fit the costs proportionately.

There are three main types of *quality indicators*. The groupings follow Donabedian’s (1988) concept: structural indicators, process indicators and outcome indicators. *Structural indicators* are related to the characteristics and inputs of the healthcare system, such as the employees’ skills and abilities, how well the facilities are equipped, etc. *Process indicators* – just as their name suggests – measure events that happen with and for the patients (care-giving happens in the right way, patients receive the necessary medication, etc.). *Outcome indicators* are to provide information on the end result of all the processes (e.g.: a patient that undergone a serious leg operation and rehabilitation can walk again or not). (Dénes, 2015a)

All types of quality indicators must meet the following criteria: validity, objectivity, specificity, sensitivity, continuity, adequacy, reasonableness, efficiency, effectiveness, availability, representativeness and reproducibility.

Using too many indicators is costly, and does not result in significantly better results than using only a few, but well-chosen ones (Foundation for Health Care Quality, 1997).

It is useful when a chosen indicator is used both in domestic and international settings, because it makes benchmarking possible.

Indicators are applied for three distinct purposes.

1 The value of an indicator should be compared to a pre-set threshold. The definition of these thresholds is resource intensive, moreover, there is the need to test the indicators. By comparing the actual value of an indicator to a preset threshold is an effective method both for identifying problems and for defining development efforts as well.
2 Changes in the value of indicators can be tracked by regular or continuous measurements.

3 Truly comparable indicators and data can also be benchmarked to similar indicators and data from other institutions, departments.

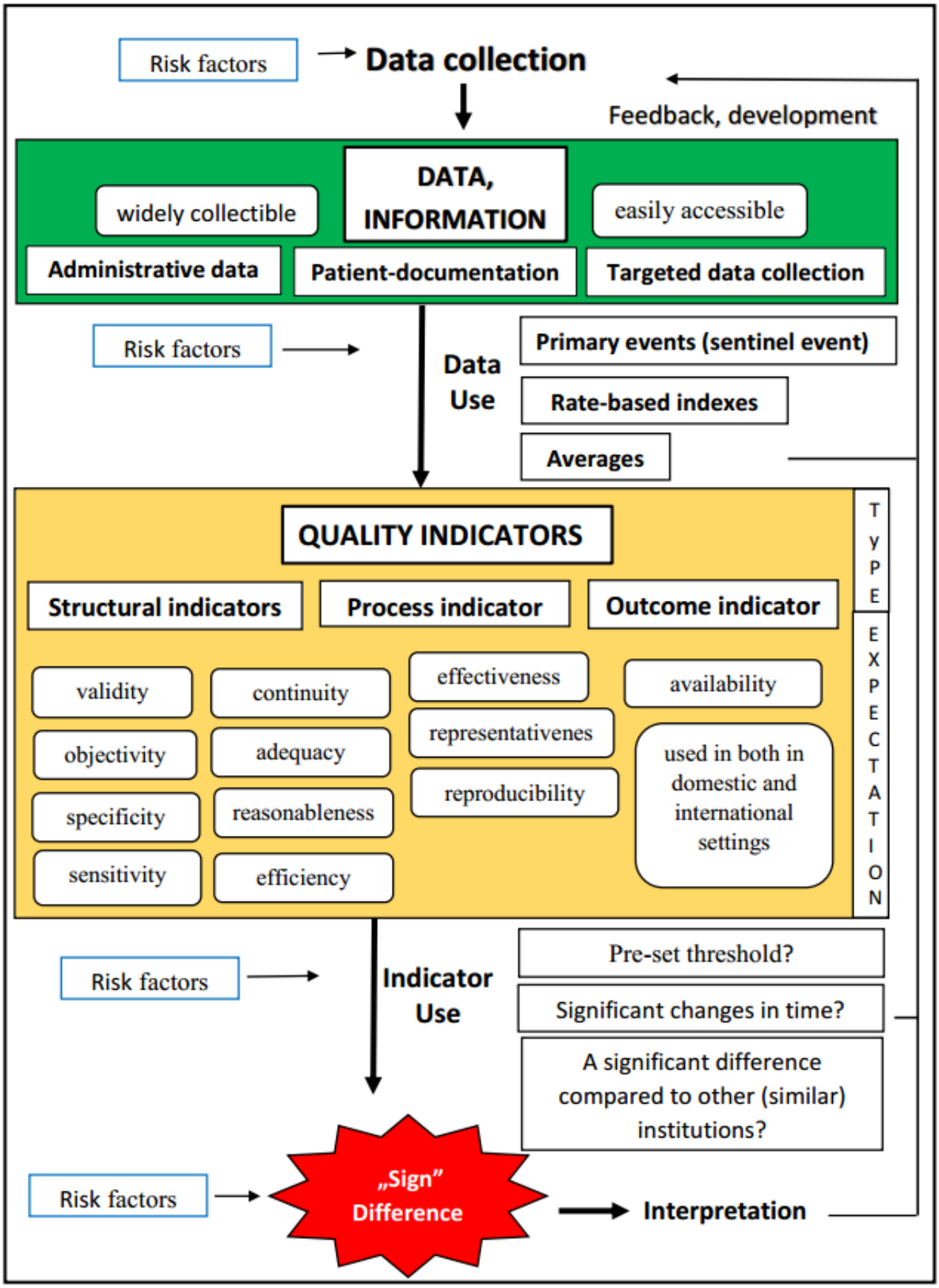


**Figure 1**

The use of quality indicators in healthcare

If the value of an indicators is above or below the pre-set threshold or previous results or other institutions' data, then the indicator did its job, it "signaled". The indicated area requires more in-depth study and analysis.

External influencing factors must be taken into consideration, especially due to the subjective factors appearing during the measurement of quality in healthcare.

In practice, the use of indicators should be focused on a specialized field owing to the high complexity of healthcare services. In the followings the indicators relating to musculoskeletal disorders and their rehabilitation.

## 3. Musculoskeletal disorders - quality indicators

According to the Global Burden of Disease Study the years lived with disabilities (YLD) have been increased over the past two decades (Vos at all, 2015). There are several ailments which can result in life years lived with limitations, but one group of illnesses is especially remarkable: the musculoskeletal disorders. According to the results of the aforementioned study the number of patients, who suffer from musculoskeletal disorders are very high and ever increasing. Nowadays musculoskeletal diseases and the rehabilitation of the patients suffering from this kind of illness has become a leading healthcare problem both in the EU and world-wide (KSH, 2010).

Not only make illnesses belonging to this kind of disorders everyday life harder and deteriorate its quality, but also have a serious effect on the patient's ability to work. On top of this, such illnesses burden both socially and financially the healthcare system. (Dénes, 2015b).

Based on the above described facts the use and recognition of quality indicators related to musculoskeletal diseases and their rehabilitation is becoming widely applied worldwide. Moreover, numerous new indicators are developed and put to use regularly in this field. (Dénes, 2015a).

## 4. Bed occupancy

Bed occupancy is one of the widely-used (quality) indicators. Taking into consideration the quality dimension of services that is published by Berry at all (1990), bed occupancy can be related to quality indicators in the healthcare. Based on this kind of indicator tools can be developed which assess performance measures based on activities within a hospital, and hence, it improves the efficiency of bed management and facilitates a more effective use of resources (McClean and Millard, 1995). The rate of this indicator is mainly depends on the profile of the institution or the department. The use of bed occupancy rate (of the investment or the department of the hospital) helps to satisfy the different quality requirements and thus contributes to the development of healthcare quality.

This indicator is of high importance in Hungary as the financing of the Hungarian healthcare system is based on the measured bed occupancy rate of the institutions. The following bed occupancy formula is used in Hungary:

$$bed\ occupancy = \frac{number\ of\ patients'day\ (inpatient\ days\ of\ care)}{number\ of\ the\ potential\ patients'day}$$

The Hungarian literature is not rich in information regarding this kind of indicator, however, there are some important and useful studies in the international literature (Haider et al., 2008; Vos at all, 2015). Several studies detail not only the bed occupancy rate (per year), but the vacancy rate and turn-over rate as well.

According to the study of the ESKI Health Science Bureau (Determination of the capacities in the health care, 2006) the most popular method for planning hospital needs in Germany (the calculation of hospital beds) is the American Hill-Burton formula (HBF). The bed occupancy formula is the part of the Hill-Burton formula method, calculated differently from the Hungarian form:

$$bed\ occupancy\ (bettennutzungsgrad) = \frac{number\ of\ patients'day\ (inpatient\ days\ of\ care) \cdot 100}{number\ of\ the\ bed\ available \cdot 360}$$

Bed occupancy indicator not only reflects changes in the service provided by any hospital, but also provides necessary data of seasonal variations. With this indicator it is possible to suggest necessary measurements to improve the quality of services and prepare healthcare to meet the requirements of the community. (Haider et al., 2008)

In the followings the indicators of bed occupancy and other related metrics are discussed, which are used in musculoskeletal disorders and their rehabilitation (Figure 2 and Figure 3). My conclusions are drawn from data deriving from the intensive research based on domestic and international literature.

The bed occupancy indicator calculated with the formula used in Hungary works well: shows the differences between the different regions of Hungary (see Figure 2). For example, bed occupancy is higher in West Hungarian institutions (98.1 %), and it is higher at the C, I, J, K departments too (red columns in Figure 3). Figure 2 shows that bed occupancy is relatively low in the Southern Great Plain region (83.8 %).

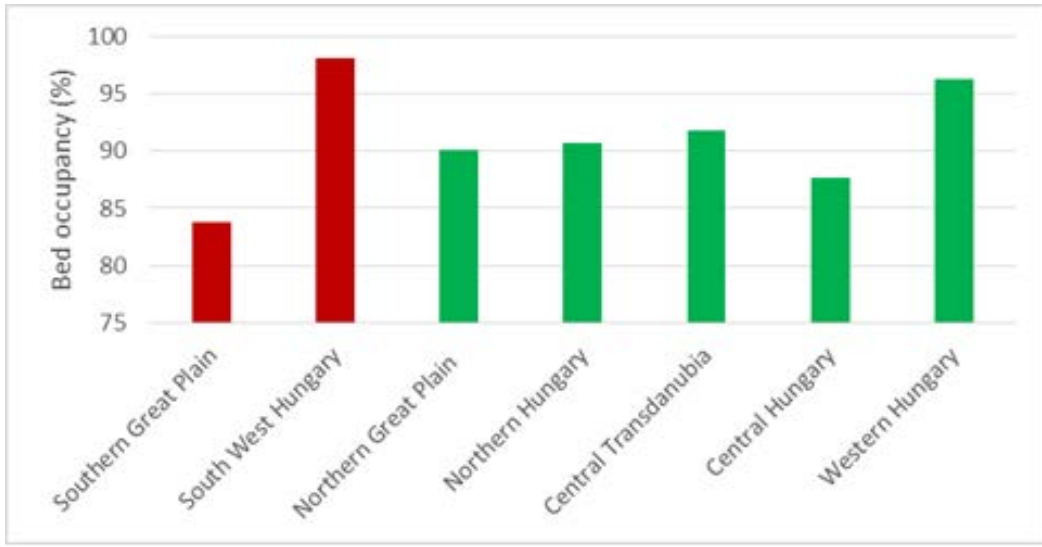


**Figure 2**

Bed occupancy averages of the different Hungarian regions (Source: data of the institutions specialized in the rehabilitation of musculoskeletal diseases, National Statistical Data Collection Program, 2014)

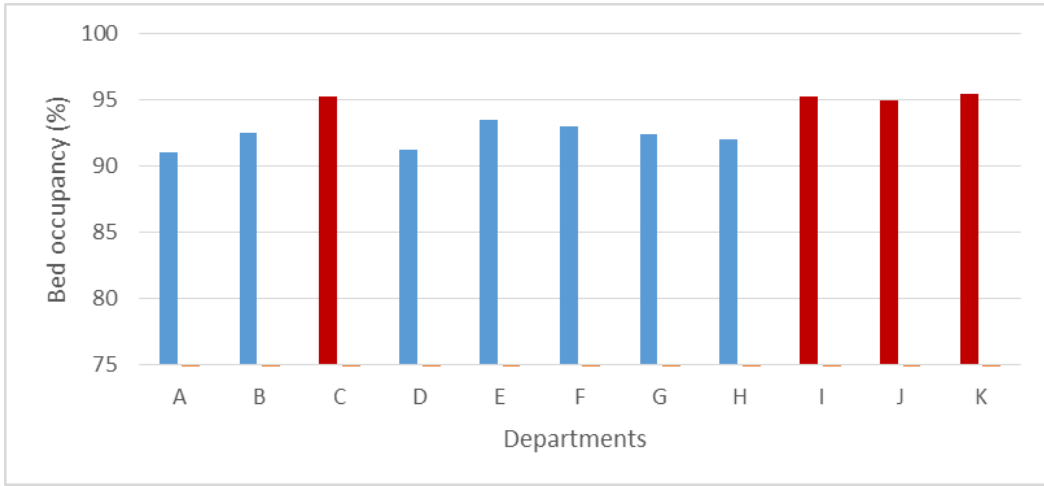


**Figure 3**

Bed occupancy of different departments of a chosen Hungarian healthcare institution

specialized in the rehabilitation of musculoskeletal diseases, 2014

The weakness of the method is that there are no thresholds regarding the bed occupancy indicator either in Hungary or internationally. Moreover, no threshold is found in the literature and no threshold is used in practice.

One might expect that the best bed occupancy rate (in a department) should be as close as 100%. This is not right, because in this case it means that the turnover time is not enough for special hygienic procedures.

It is also true for average bed occupancy. The 100 % average bed occupancy means that some institutions should have rates above 100%, and the surplusage is not paid by the social insurance in Hungary. According to this insurance regulation the regional average equal to 80-90 % is expected as ideal, but there are some hospitals in Hungary with rates of 116,7 % or even 120 % (National Statistical Data-collection Program, 2014).

On the other hand, it is clear that low bed occupancy is not good for the institutions (or departments). For establishing ideal rates which suit healthcare institutes economically, it would be necessary to set threshold values.

It actually matters how we use the indicator: analyze and plot the bed occupancy or analyze the opposite indicator, the vacancy rate (Table 1). The vacancy rate can be used better as an indicator to draw attention to the differences.

**Table 1** The bed occupancy and vacancy rate of the Hungarian regions

| Region | Bed occupancy (%) | Vacancy Rate |
|---|---|---|
| **Southern Great Plain** | 83.8 | 16.2 |
| **South West Hungary** | 98.1 | 1.9 |
| **Northern Great Plain** | 90.1 | 9.9 |
| **Northern Hungary** | 90.7 | 9.3 |
| **Central Transdanubia** | 91.8 | 8.2 |
| **Central Hungary** | 87.7 | 12.3 |
| **Western Hungary** | 96.3 | 3.7 |

In Section 2 the formulas of the bed occupancy were discussed. The difference lies in the denominator: the Hungarian formula contains the number of „potetial patients' day" contrary to the foreign method using the number of the available beds as denomonator. The different data is illustrated in Figure 4 and Figure 5. A question arises: Which formula is more useful for calculating the bed occupancy indicator? This question need to be answered in the future.

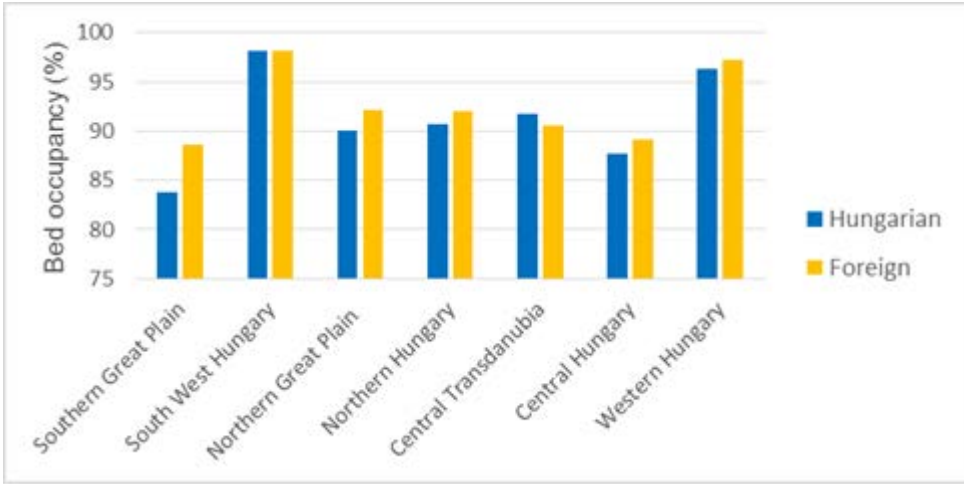


**Figure 4**

Bed occupancy averages of the Hungarian regions (Hungarian formula vs. foreign formula), 2014

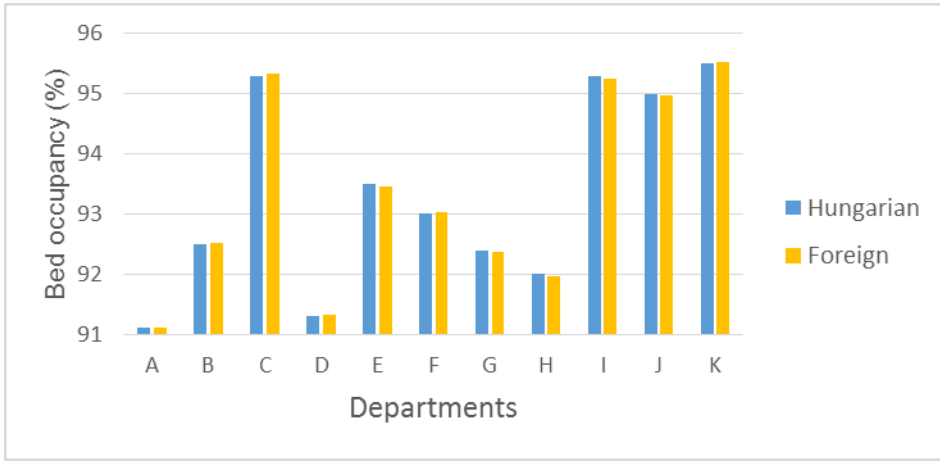


**Figure 5**

Bed occupancy averages of a Hungarian healthcare institution (Hungarian formula vs. foreign formula), 2014

## Conclusion

The above described examples show that the use of the bed occupancy as a quality indicator in healthcare is expedient and beneficial: it draws attention to areas (institutions, departments) where actions are to be taken, changes are to be made. This quality indicator together with others have proven to be useful not only for the purposes of quality management, but also for economic benefits of healthcare in general. Further refinement and testing should be actively pursued along with the development of new, specified indexes.

From the daily practice of healthcare it is becoming clear that the use of thresholds related to the bed occupancy indicator would be practical: it makes the examination and the comparison processes easier, thus the use of this kind of quality indicator could become easier.

Unfortunately, the use of bed occupancy indicator and its application is not yet widespread enough. In Hungary this tool of quality management is still in its infancy. Healthcare subventions are decreasing and this situation is not likely to change in the near future. But it seems that there are great potentials in the quality development systems and quality indicators in healthcare to improve economic opportunities.

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