Identification of the Functionality Level of Day Surgery in Slovakia[1]

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Abstract

Implementation of day surgery system in Slovakia was launched in recent years but complex analysis of its functionality is not available. To assess current status, expert panel was created to identify principal strengths, weaknesses, opportunities and threats (SWOT) and multi-level SWOT analysis performed to evaluate the level of functionality/multifunctionality. Total value of weaknesses (W = 4.9176) outweighed total value of strengths (S = 4.79291), while total value of opportunities (B = 108) outweighed total value of threats (R = 71). As such, Slovak day surgery system can be described as functional concept limited by incorrect setting of particular components. Financial issues appear to be leading barrier of its development as current reimbursement policy is demotivating and further investments are needed to improve insufficient and vulnerable infrastructure. Attention should be paid to systematic analysis of feedback data by all important stakeholders involved in the field to provide validated arguments for systemic adjustments.

Keywords: *day surgery, outpatient surgery, ambulatory surgery, one day surgery, same-day surgery, healthcare system, development barriers, performance efficiency*

JEL Classification: I13, I15, I19

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Introduction

Day surgery, often preferred by the patients, represents viable option allowing to save financial resources of health insurance companies. Although day care is well defined and established for more than 30 years, with prevalence as high as 90% for certain surgical procedures, in Slovakia it only accounts for 7% of all surgically treated patients. Despite the fact that implementation of day surgery into Slovak health care system is supported by both Ministry of Health of the Slovak Republic and health insurance companies, thus being included into governmental programme for over 15 years, there are still variables that prevent its wider utilization and thus prohibiting significant savings of financial resources.

In the era of proclaimed necessity to transform system of public health insurance and need to increase effectiveness of health care by both reducing the costs and optimizing financial flows between health insurance companies and health care providers, topic of day surgery represents highly up-to-date issue in the area of health care financing, focused onto by subjects at various levels of Slovak health care system. To our best available knowledge, there are no publications available either in Slovakia or Visegrad countries that would deal with this issue in its whole complexity, thus underlying unique value of such analysis with potential to implement its findings with the goal of achieving significant financial savings while maintaining/improving high quality of care. Such multilevel and multidimensional analyses are needed to support any governmental decisions which are anticipated by recognized international institutions (e.g. OECD recommendations to reduce total number of hospital beds). Only evidence based decisions may protect patient as the final consumer of health care services, inhibiting possible adverse consequences of any systemic changes. Furthermore, such decision making process may increase credit of Slovakia in international context as health care system reform is meticulously observed from the external environment.

Above mentioned facts explain the importance of the topic not only on the level of national economy but also in global perspective. International organizations such as OECD, WHO and Eurostat indicated methodological and conceptual problems that could be anticipated during day surgery programme implementation (Lafortune, Balestat and Durand, 2012). Activities were initiated to develop universally accepted international questionnaire to collect consistent and comparable data on surgical care. Such data should constitute the base for national and international benchmarking, thus creating a platform allowing for further increase in the effectiveness of day surgery and health care systems overall. Our ambition was to draw attention to this topic, as functionality level analysis, describing day surgery system functionality determinants and systemic

weaknesses with possible preventing/improving measures, represents logical prerequisite for progress in implementation of day surgery system in Slovakia. Without such analysis, evidence based decision making is not possible.

Background

Numerous studies declare extensive research activities in the field of day surgery across the world and show significant benefits especially from the procedural point of view (Majholm et al., 2012; Sun, Demonner and Davis, 2012; Engbaek, Bartholdy and Hjortso, 2006; Minatti et al., 2006; Smith et al., 2006; Skattum et al., 2004; Coley et al., 2002). In Slovakia however, no research has been carried out to evaluate the use of day surgery with respect to basic determinants and critical areas for its development. Published data from available foreign studies are difficult to compare due to specific research problems and hypotheses which in turn reflects their limited external validity. Nevertheless, those data represent valuable platform for further development of day surgery in all its branches.

Despite undisputable spread of day surgery, number of clinical studies available to compare traditional inpatient surgical care and day surgery, with respect to quality of surgical performance and subsequently overall surgical care, is limited (Castoro et al., 2007). However, those published failed to detect significant differences in the overall results from medical point of view (Fedorowicz et al., 2011; Gurusamy et al., 2008) thus highlighting safety and non-inferiority of performing day surgery, provided that providers comply with all recommended guidelines and organizational principles. This is of course applicable only for less complex procedures suitable for day surgery. Current development in the field is mainly driven by the spread of innovative minimally invasive surgical procedures with contribution of modern anesthesiology protocols introducing short-acting anesthetics (Gupta et al., 2004) and improved techniques of regional anesthesia (O'Donnell and Iohom, 2008) through which reduced recovery time after surgery and better postoperative pain control can be achieved (Elvir-Lazo and White, 2010).

It is obvious that principal advantage of day surgery is effective reduction of costs of medical care. Castoro et al. declare that improvement of health care processes may lead to decrease in the unit costs by 25 – 65% on average on the ground of a substitution of inpatient health care by one-day surgery (Castoro et al., 2007). Further reduction of health care costs can be achieved by possible reduction of the total number of hospital beds and by restructuring network of

health care providers thus allowing for improvement of overall financial effectiveness of health care services (Smith et al., 2006; Skattum and Chung, 2004).

Nevertheless, economic perspective must not be seen as the only principal determinant in health care. It is inevitable to point out that when designing day surgery system, improved health care availability and quality should be seen as a target. It is therefore not surprising that the effectiveness and quality outcomes of day surgery are considered to be significant determinants of its development (Shnaider, 2006).

Important measure to assess the quality and success of day surgery is the number of post-surgery hospital visits and readmission rate. These quality indicators are particularly important in case of more complex surgical procedures and in patients with substantial comorbidity. According to statistics available, the most common reason why patients contact hospital after discharge is bleeding (40 – 50%) and infectious complications that occur in 0.3 – 0.4% of the total number of day surgery patients (15). Interestingly, advanced age of the patients was not found to be a significant risk factor for day surgery despite the fact that this patient group suffers from significant comorbidities compared to young patients (Sinha et al., 2007; Aldwinckle and Montgomery, 2004; Chung, Mezei and Tong, 1999). In recent years, the proportion of elderly patients undergoing day surgery increases also due to age-specific diagnoses treated. This trend can be clearly observed in glaucoma or cataract surgery (Wasowicz-Kemps, 2008).

Main advantage of day surgery from patient´s perspective is reduced length of hospital stay. Research conducted in the field generally declares high patient´s satisfaction rate (Wasowicz-Kemps, 2008). Availability of adequate information creating awareness about the procedure and effective communication and interpersonal skills of the medical staff were identified as principal determinants of patient´s satisfaction (McCormack and Manley, 2003; Bates, 2000). From methodological point of view, it is necessary to highlight the importance of correct choice of detection methods for patient´s satisfaction analysis. Methodology chosen should facilitate willingness of patients to express the unbiased level of their satisfaction as this may be compromised by various reasons (e.g. patient may provide false positive feedback due to being still dependent on the evaluated staff). For the time being, it has to be admitted that relevant literature does not provide generally accepted questionnaires to be executed in the process of examination and evaluation of patient´s satisfaction specifically designed and validated for day surgery. As such, available data on patient´s satisfaction with day surgery should be interpreted with care.

Proportion of day surgery on the overall surgical care varies but may be as high as 48% of all elective procedures (Punnonen, 2009). Trends in utilization of

day care cannot be described as uniform in all hospitals, since there are large differences in performance across health care providers, depending on their function and structure as well as tradition (Meshkat et al., 2012). Distinct differences in the performance level among hospitals could be explained also by health care managerial issues, since more complex procedures tend to be centralized to larger hospitals, while smaller providers are limited to less-complex surgeries, thus more suitable for day surgery care.

Of note from organizational point of view, progress in the use of day surgery can be attributed to political decision to increase financial incentives for shortening waiting lists for specific procedures. Such strategy was successfully executed in the Netherlands in the late 90's. Increase in volume of day surgery cases was detected despite the fact that proportion of day surgery before applying new strategy was comparable with the average numbers in other Western countries (USA, Canada, Denmark, Finland, Norway, Belgium, Germany, France, Spain and Italy) (Wasowicz-Kemps, 2008). Although innovative minimally invasive surgical procedures along with optimization of anesthetic care should be the leading determining factors of development, it is obvious that for the time being those are overridden by financial restrictions. The way how surgical care providers are being reimbursed by health insurance companies is the key issue (Šoltés, 2011). Should it be financially more attractive to keep patients in the hospital rather than offer day care, negative consequences on development of day surgery are inevitable, regardless the type of procedure discussed. Therefore, motivating system of payment should be based on diagnosis-related groups rather than type of care (in hospital vs one day), provided that financial amount offered reflects real costs of treatment (Gavurová and Hyránek, 2013; Gavurová, Klepáková and Ivančová, 2013; Šoltés and Gavurová, 2014).

Basic assumption of this research is a premise that main causes limiting day surgery functioning in Slovakia are organizational issues, mainly economically demotivating system due to incorrect set-up of reimbursement policy by insurance companies.

Aims

Based on the facts mentioned above, the aim of the study is to detect the level of day surgery malfunctioning in Slovakia and to identify potential reasons. For this purpose, malfunction is defined as a failure of particular health care provider to achieve individual goals related to the implementation of day surgery concept and by no means understood as a failure to achieve benefits of day surgery from medical point of view. Negativistic formulation of the problem was selected

deliberately in order to highlight aspects of health care provider´s performance rather than improvements in medical field which are beyond the scope of this study.

Material and Methods

Research was conducted during the period 1. 1. – 30. 6. 2012. Background platform mapping characteristics of the penetration of day surgery in Slovakia was provided by the secondary data from national databases of the National Health Information Centre (NHIC). Balanced expert panel was identified including representatives of health care providers, professional associations and other institutions involved in the day surgery system. Semi-structured interview and brainstorming techniques (Gavurová, 2012) were used to select components for multilevel SWOT analysis, resulting in a list of possible strengths, weaknesses, opportunities and threats in the Slovak day surgery system. Evaluation of identified components (n = number of components) was needed to provide their mutual appreciation. Analysis itself was further carried out as follows:

Evaluation of strengths (*S*) was carried out through the evaluation by experts (m = number of experts) using the method of paired comparisons, which is based on the assumption of mutual pair-wise evaluation of all the pairs of alternatives.

Number of samples, in which there is a need for pair evaluation is defined as $\frac{\boldsymbol{n}}{2}(\boldsymbol{n}-1)$.

Experts compared each pair of selected combinations of factors in terms of their mutual importance by indicating more important factor of the combination. By such determination level of priority could be set for each factor. It is logical that the highest possible frequency could be achieved on the level $n - 1$, where n is the number of options that have been evaluated. This priority was marked as PRS_{ij} where i represents the i-th alternative and j represents the j-th evaluator.

On the base of assessment values for each alternative, absolute value of priority (PVS_i where i is the serial number of alternative) was calculated as follows:

$$\boldsymbol{PVS_i} = \sum_{\boldsymbol{j}=1}^{\boldsymbol{m}} \boldsymbol{PRS_{ij}} \text{ ; where } \boldsymbol{i} = \{1,2,...\boldsymbol{n}\} \text{ a } \boldsymbol{j} = \{1,2,...\boldsymbol{m}\} \quad (1)$$

Summarizing table was created in the following manner – columns: evaluators by number, frequency of PVS_i occurence, lines: alternatives (Table 1).

T a b l e 1

Alternatives of Individual Evaluators

Alternative	Evaluator 1 (PRS_{ij})	Evaluator 2 (PRS_{ij})	Evaluator 3 (PRS_{ij})	Evaluator 4 (PRS_{ij})	Evaluator 5 (PRS_{ij})	Frequency of occurrence PVS_i
A	2	5	1	1	2	11
B	1	7	2	3	2	15
…						

PVS_i – absolute value of priority where i is a serial number of each alternative;
PRS_{ij} – level of priority where i represents i-th alternative and j represents j-th evaluator.

Source: Own processing.

Weight of each alternative was assessed by using the standardization with the following formula:

$$\boldsymbol{vps_i} = \frac{\boldsymbol{PVS_i}}{\sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{PVS_i}}, \text{ where } \boldsymbol{i} = \{1,2,...\boldsymbol{n}\} \tag{2}$$

Based on the stated, set of alternative weights was calculated, sum of which is equal to one.

$$\sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{vps_i} = 1, \text{ where } \boldsymbol{i} = \{1,2,...\boldsymbol{n}\} \tag{3}$$

Subsequent scoring of each strength was implemented through a numerical scale of 1 – 7, where 1 represents the lowest and 7 is the highest level of actual achievement. The values were then multiplied by weights. Value of strengths can be calculated:

$$\boldsymbol{S} = \sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \bar{\boldsymbol{s}}_{\boldsymbol{i}} \cdot \boldsymbol{vps_i} \tag{4}$$

where $\bar{\boldsymbol{s}}_{\boldsymbol{i}}$ means the average evaluation score assigned by the evaluator of the strengths:

$$\bar{\boldsymbol{s}}_{\boldsymbol{i}} = \frac{\sum_{\boldsymbol{j}=1}^{\boldsymbol{m}} \boldsymbol{s_{ij}}}{\boldsymbol{m}}; \text{ where } \boldsymbol{i} = \{1,2,...\boldsymbol{n}\} \text{ a } \boldsymbol{j} = \{1,2,...\boldsymbol{m}\} \tag{5}$$

Evaluation of weaknesses – an overall assessment of the weaknesses of analyzed organization or system can be calculated (marked W, w_{ij} used for calculation) in a similar way:

$$PVW_i = \sum_{j=1}^{m} PRW_{ij} \text{ ; where } i = \{1,2,...n\} \text{ a } j = \{1,2,...m\} \quad (6)$$

Weight of each alternative was assessed by using the standardization with the following formula:

$$vpw_i = \frac{PVW_i}{\sum_{i=1}^{n} PVW_i}, \text{ where } i = \{1,2,...n\} \quad (7)$$

Based on the stated, set of alternative weights was calculated, sum of which is equal to one.

$$\sum_{i=1}^{n} vpw_i = 1, \text{ where } i = \{1,2,...n\} \quad (8)$$

Subsequent scoring of each weakness was implemented through a numerical scale of 1 – 7, where 1 represents the lowest and 7 is the highest level of actual achievement. The values were then multiplied by weights. Weaknesses value can be calculated:

$$W = \sum_{i=1}^{n} \bar{w}_i \cdot vpw_i \quad (9)$$

where $\bar{s}_i$ means the average evaluation score assigned by the evaluator of the weakness:

$$\bar{w}_i = \frac{\sum_{j=1}^{m} w_{ij}}{m}; \text{ where } i = \{1,2,...n\} \text{ a } j = \{1,2,...m\} \quad (10)$$

Evaluation of opportunities – severity of the opportunity impact on the organization or system was assessed via 5 point scale first (Table 2).

T a b l e 2

Scale Assessing Severity of Opportunity Impact

Severity of the opportunity impact	Number of points (A_i)
Insignificant	1
Limited significance	2
Significant	3
High significance	4
Unacceptable	5

A_i – severity of *i*-th opportunity impact in points.

Source: Own processing.

In the next step it was important to distinguish the probability of the opportunity occurrence. Opportunities may have the nature of the phenomena, probability of which can be exactly measured. As opportunities analyzed in this SWOT analysis might not be exactly measurable, combination of range scale with threat likelihood measuring scale was chosen as declared in Table 3.

T a b l e 3

Scale Assessing Probability of the Opportunity Occurrence

The likelihood of the opportunity	**Number of points (P_i)**
Almost impossible to 0 – 20%	1
Possible 21 – 40%	2
Common 41 – 60%	3
Highly probable 61 – 80%	4
Almost certain 81 – 100%	5

$\boldsymbol{P_i}$ – probability of *i*-th opportunity occurence in points.

Source: Own processing.

In case that it was possible, the exact probability of the opportunity was calculated by using the formula:

$$\boldsymbol{p} = \frac{\boldsymbol{N}}{\boldsymbol{U}} \tag{11}$$

where

p – the probability of the opportunity occurrence,
N – the overall incidents of that opportunity,
U – the total number of specified events regardless of the fact whether they had or had not positive effect.

Then it was necessary to identify correct number of points by comparing calculated likelihood with the values set in Table 3.

Based on the above mentioned variables, risk value for each type of benefit could be defined by the formula

$$\boldsymbol{B_i} = \boldsymbol{A_i} \cdot \boldsymbol{P_i} \tag{12}$$

where

Bi – the level of *i*-th opportunity,
Ai – value of magnitude of the *i*-th opportunity.
Pi – the value of the probability of a positive effect occurence of the *i*-th opportunity.

The overall level of opportunities could then be calculated as the total sum of partial values for every particular opportunity:

$$\boldsymbol{B} = \sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{B_i} \tag{13}$$

Evaluation of threats – severity of the threat impact was assessed via 5 point scale first (Table 4).

T a b l e 4

Scale Assessing Severity of the Threat Impact

Severity of the threat impact	Number of points (Z_i)
Insignificant	1
Limited significance	2
Significant	3
High significance	4
Unacceptable	5

$\boldsymbol{Z_i}$ – severity of impact of *i*-th threat in points.

Source: Own processing.

In the next step it was important to distinguish the probability of the threat occurrence. Threats may have the nature of the phenomena, probability of which can be exactly measured. As threats analyzed in this SWOT analysis might not be exactly measurable, combination of range scale with threat likelihood measuring scale was chosen as declared in Table 5.

T a b l e 5

Scale Assessing Probability of the Threat Occurrence

Likelihood of the threat	Number of points (P_i)
Almost impossible to 0 – 20%	1
Possible 21 – 40%	2
Common 41 – 60%	3
Highly probable 61 – 80%	4
Almost certain 81 – 100%	5

$\boldsymbol{P_i}$ – probability of the *i*-th threat occurence in points.

Source: Own processing.

In case that it was possible, the exact probability of the threat was calculated by using the formula 11. Based on the above mentioned variables, risk value for each type of the threat could be defined by the formula

$$\boldsymbol{R_i = Z_i \times P_i} \tag{14}$$

where

R_i – the level of the thread risk of *i*-th threat,

Z_i – the value of the severity of the *i*-th threat impact,

Pi – the value of the probability of the *i*-th threat occurence.

The overall threat level could then be calculated as the total sum of partial risk values for every particular threat:

$$\boldsymbol{R} = \sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{R_i} \tag{15}$$

To determine the overall conclusions of day surgery system functionality analysis, the evaluation through comparisons between the basic components of SWOT analysis was chosen. The evaluation system is presented in Table 6.

T a b l e 6

Functionality Levels of Day Surgery

	Functionality level of day surgery system	**Problem**	**Output of the SWOT analysis**
1	Fully functional and very well-functioning system	---	Prevalence of strengths over weaknesses, opportunities over threats
2	Functional system	Incorrect setting of system components	Prevalence of weaknesses over strengths, opportunities over threats
3	Limited functionality	Certain components absent in the system	Prevalence of strengths over weakness, threats over opportunities, duration time of threat is up to 40% of the planned time period
4	Dysfunctional system	Absenting components and incorrect setting of existing components in the system	Prevalence of weaknesses over strengths, threats over opportunities, duration time of threat is up to 40% of planned time period
5	System not-functioning	Absenting conditions necessary for the functioning system	Prevalence of weaknesses over strengths, threats over opportunities, duration time of threat is over the 40% of planned time period

Source: Own processing.

Results

Specialists in the field of day surgery in Slovakia were identified, approached and panel of 11 experts was created to carry out SWOT analysis as described in the methodology of the research. The structure of the final expert team included 11 incorporating: 5 members of Slovak Association for Day Surgery (SAJCH) – 3 representatives of state owned and 2 representatives of private healthcare providers, 2 members of Association of Hospitals in Slovakia – 2 representatives of university hospitals and 4 experts involved in both academic and healthcare environment with extensive experience with day surgery. Due to the specificity of the analyzed problem (assessment of functionality of the system) only the parties directly or indirectly influenced by its functioning were involved in the panel, so no representatives of Ministry of Health of the Slovak Republic and/or insurance companies were involved as their view might bias the results.

Selected strengths as components for SWOT analysis are summarized in Table 7 (marked with identification symbols for simplification).

Relative importance of individual factors which can affect the system of day surgery was evaluated by each expert with an evaluation example sheet shown in Table 8.

T a b l e 7

Selected Strengths of Day Surgery System

Strength	Symbol
Support from Ministry of Health of the SR	*S01*
Availability of modern information systems	*S02*
Wide range of day surgery procedures provided	*S03*
Significant reduction of healthcare costs	*S04*
Public demand for day surgery care	*S05*
Pressure of health insurance companies to implement day surgery	*S06*
Significant decrease of patient sick leave (social insurance savings)	*S07*
Guidelines on day surgery performance issued by Ministry of Health of the SR	*S08*
Obligation of health care provider to state relevant reasons in case of day surgery refusal	*S09*

S01..S09 – identification symbols for particular strengths.

Source: Own processing.

T a b l e 8

Example of Evaluation of Mutual Importance for Each Factor

	S01	*S02*	*S03*	*S04*	*S05*	*S06*	*S07*	*S08*	*S09*	PRS_{ij}
S01		S01	S01	S04	S05	S01	S01	S01	S01	6
S02			S03	S04	S02	S02	S02	S02	S02	5
S03				S03	S04	S06	S07	S03	S03	4
S04					S05	S06	S04	S08	S04	5
S05						S05	S05	S05	S05	6
S06							S07	S06	S06	4
S07								S08	S09	2
S08									S08	3
S09										1

S01..S09 – identification symbols for particular strengths;
PRS_{ij} – level of priority where *i* represents *i*-th alternative and *j* represents *j*-th evaluator.

Source: Own processing.

Sums of all occurrences of strengths (thus calculated PVS_i values) are presented in Table 9.

T a b l e 9

Calculation of PVS_i Values

	S01	*S02*	*S03*	*S04*	*S05*	*S06*	*S07*	*S08*	*S09*
PVS_i	68	71	50	51	48	40	26	27	15

S01..S09 – identification symbols for particular strengths;
PVS_i – absolute value of priority where *i* is a serial number of strength.

Source: Own processing.

Weight of individual strength can be calculated using the formula:

$$\boldsymbol{vps_i} = \frac{\boldsymbol{PVS_i}}{\sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{PVS_i}} \rightarrow \boldsymbol{vps}_1 = \frac{\boldsymbol{PVS}_1}{\sum_{\boldsymbol{i}=1}^{11} \boldsymbol{PVS_i}} = \frac{68}{396} \doteq 0.172 \tag{16}$$

with vps_i values for particular strengths summarized in Table 10.

T a b l e 10
Calculation of vps_i Values

	S01	*S02*	*S03*	*S04*	*S05*	*S06*	*S07*	*S08*	*S09*
vps_i	0.172	0.179	0.126	0.129	0.121	0.101	0.066	0.068	0.038

S01..S09 – identification symbols for particular strengths;
vps_i – weight of particular alternative standardized according to formula (2).

Source: Own processing.

Results of subsequent assessment of actual achievement of each factor in the current system on the scale of 1 – 7, reached by the expert group consensus, are reflected in Table 11.

T a b l e 11
Assessment of Strengths Achieved by Expert Group Consensus

	S01	*S02*	*S03*	*S04*	*S05*	*S06*	*S07*	*S08*	*S09*
Evaluation	3.73	4.82	5.18	6.27	4	6.82	4.64	4	2

S01..S09 – identification symbols for particular strengths.

Source: Own processing.

The total value of the strengths was calculated using the formula:

$$\boldsymbol{S} = \sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \overline{\boldsymbol{s}_{\boldsymbol{i}}} \cdot \boldsymbol{vps}_{\boldsymbol{i}} = 0.172 \cdot 3.73 + 0.179 \cdot 4.82 + \ldots + 0.038 \cdot 2 = 4.9291 \qquad (17)$$

T a b l e 12
Selected Weaknesses of Day Surgery System

Weakness	**Symbol**
Failure to achieve targets in the implementation of the day surgery as set in the Declaration of the Government	*W01*
Inadequate legislative support	*W02*
Insufficient and vulnerable infrastructure for extensive day surgery performance	*W03*
Absence of performance standards for day surgery procedures	*W04*
Limited interoperability of information systems	*W05*
Small number of centres specialized for day surgery	*W06*
Need for multi-million investments to create day surgery facilities without return warranty	*W07*
Demotivating system of reimbursement for day surgery providers	*W08*
Disproportionate public demand – certain socio-economic groups still favoring inpatient surgical care	*W09*
No guarantee of stable contracts with health insurance companies necessary for financial stability of specialized day surgery providers	*W10*
Tendency to keep less complex procedures in inpatient care, as those are reimbursed over their actual costs, thus creating financial reserve to cover more complex surgeries which are underpaid – result of unbalanced reimbursement system	*W11*
Limited contracts for day surgery determining monthly reimbursement limits, thus creating long waiting lists (more than 6 months)	*W12*
Non-existing catalogs of day surgery procedures which would allow reimbursement for specific procedure rather than diagnosis	*W13*
Policy of health insurance companies limiting development of day surgery facilities by limited contracts and unfavorable reimbursement rules	*W14*
Disproportionate difference between financial amount paid for the same procedure in inpatient and day surgery care, strongly in favor of inpatient care	*W15*

W01..W15 – identification symbols for particular weaknesses.

Source: Own processing.

Selected weaknesses as components for SWOT analysis are summarized in Table 12 (marked with identification symbols for simplification).

Sums of all occurrences of weaknesses (thus calculated PVW_i values) are presented in Table 13.

T a b l e 13

Calculation of PVW_i Values

	W01	*W02*	*W03*	*W04*	*W05*	*W06*	*W07*	*W08*	*W09*	*W10*	*W11*	*W12*	*W13*	*W14*	*W15*
PVW_i	124	106	88	104	99	101	76	68	28	73	48	79	59	52	50

W01..W15 – identification symbols for particular weaknesses;
PVW_i – absolute value of priority where *i* is a serial number of weakness.

Source: Own processing.

Weight of individual weakness can be calculated using the formula:

$$\boldsymbol{vpw_i} = \frac{\boldsymbol{PVW_i}}{\sum_{\boldsymbol{i}=1}^{\boldsymbol{n}} \boldsymbol{PVW_i}} \rightarrow \boldsymbol{vpw}_1 = \frac{\boldsymbol{PVW}_1}{\sum_{\boldsymbol{i}=1}^{11} \boldsymbol{PVW_i}} = \frac{124}{1155} \doteq 0{,}107 \qquad (18)$$

with vpw_i values for particular weaknesses summarized in Table 14.

T a b l e 14

Calculation of vpw_i Values

	W01	*W02*	*W03*	*W04*	*W05*	*W06*	*W07*	*W08*	*W09*	*W10*	*W11*	*W12*	*W13*	*W14*	*W15*
vpw_i	0.107	0.092	0.076	0.09	0.086	0.087	0.066	0.059	0.024	0.063	0.042	0.068	0.051	0.045	0.043

W01..W15 – identification symbols for particular weaknesses;
vpw_i – weight of particular alternative standardized according to formula (7).

Source: Own processing.

Results of subsequent assessment of actual achievement of each factor in the current system on the scale of 1 – 7, reached by the expert group consensus, are reflected in Table 15.

T a b l e 15

Assessment of Weaknesses Achieved by Expert Group Consensus

	W01	*W02*	*W03*	*W04*	*W05*	*W06*	*W07*	*W08*	*W09*	*W10*	*W11*	*W12*	*W13*	*W14*	*W15*
Evaluation	4.91	5.45	6.18	3.82	2.18	6.18	6.18	5.64	2.1	6.91	2.82	5.0	3.91	5.45	5.18

W01..W15 – identification symbols for particular weaknesses

Source: Own processing.

The total value of the weaknesses was calculated using the formula:

$$W = \sum_{i=1}^{n} \bar{w}_i \cdot vpw_i = 0.107 \cdot 4.91 + 0.092 \cdot 5.45 + \ldots + 0.043 \cdot 5.45 = 4.9176 \quad (19)$$

Weaknesses outweigh strengths, which is evident from values: S = 4.79291, W = 4.9176, S < W.

Selected opportunities as components for SWOT analysis are summarized in Table 16 (marked with identification symbols for simplification).

T a b l e 16

Selected Opportunities of Day Surgery System

Opportunity	**Symbol**
Reducing healthcare costs by increasing efficiency, eliminating duplications, errors and their impact	*B01*
Increasing interest of citizens in management of their health	*B02*
More effective pressure of the public healthcare on citizens especially in the area of revention of civilization diseases	*B03*
Opportunity to implement the latest medical technologies	*B04*
Acquisition of additional healthcare funding by increasing attractiveness of day surgery provided in Slovakia for the citizens from other EU countries	*B05*
Active participation in the EU initiatives concerning day surgery	*B06*
Mobility of health care in Slovakia and the EU	*B07*
Possibility to create precise, dynamic and up-to-date picture of health status of the population	*B08*
Opportunities to improve prevention, diagnosis and treatment of chronic non-infectious diseases	*B09*
Better administrative control of acute surgical care	*B10*
Decreasing number of hospital beds by creating centres of day surgery	*B11*
Adjusting reimbursement policy and improving reporting by introduction of coding system for every particular day surgery procedure	*B12*

B01..B12 **–** identification symbols for particular opportunities.

Source: Own processing.

Severity of opportunity impact (*A*) and probability of its occurrence (*P*) as assessed by expert panel as well as individual value of each opportunity (B_i – calculated according to formula 12) are summarized in Table 17.

T a b l e 17

Evaluating Opportunities in SWOT Analysis of Day Surgery System

	B01	*B02*	*B03*	*B04*	*B05*	*B06*	*B07*	*B08*	*B09*	*B10*	*B11*	*B12*
A_i	3	2	3	4	3	2	3	3	4	3	4	2
P_i	2	3	4	3	3	2	2	4	5	3	2	2
B_i	6	6	12	12	9	4	6	12	20	9	8	4

B01..B12 **–** identification symbols for particular opportunities;
A_i – severity of *i*-th opportunity impact in points;
P_i – probability of *i*-th opportunity occurence in points;
B_i – risk value of *i*-th opportunity calculated according to formula (12).
The total value of the opportunities is B = 108 (calculated using the formula 13).

Source: Own processing.

Selected threats/risks as components for SWOT analysis are summarized in Table 18 (marked with identification symbols for simplification).

T a b l e 18

Selected Threats/Risks of Day Surgery System

Threat/Risk	Symbol
Failure to provide adequate financial coverage for day surgery infrastructure and implementation of projects aiming at wider use of day surgery	*R01*
Underestimating importance of the legislative and standardization process	*R02*
Limited interoperability of health information systems in the absence of day surgery standards	*R03*
Reduced effectiveness of certain activities related to the day surgery due to inconsistent informatization (ordering, patient contacting, etc.).	*R04*
Dehumanization of health care	*R05*
Risk of corruption among entities involved in the distribution of resources for day surgery (waiting lists)	*R06*
Ineffective communication between health insurance companies and day surgery providers in terms of solving problems (contracts, inadequate reimbursement, monthly limits etc.)	*R07*
Elimination of certain proportion of hospital beds as a result of effective day surgery system – political problem	*R08*

R01..R08 **–** identification symbols for particular threats.

Source: Own processing.

Severity of threat/risk impact (A) and probability of its occurrence (P) as assessed by expert panel as well as individual value of each threat/risk (R_i – calculated according to formula 14) are summarized in Table 19.

T a b l e 19

Evaluation of Threats in SWOT Analysis of Day Surgery System

	R01	*R02*	*R03*	*R04*	*R05*	*R06*	*R07*	*R08*
Z_i	4	3	2	3	1	4	3	2
P_i	4	3	3	4	2	3	2	4
R_i	16	9	6	12	2	12	6	8

R01..R08 **–** identification symbols for particular threats;
Z_i – severity of i-th threat impact in points;
P_i – probability of i-th threat occurence in points;
R_i – risk value of i-th threat calculated according to formula (14).
The total value of the threats/risks is R = 71 (calculated using the formula 15).

Source: Own processing.

Comparing the threats/risks and opportunities, it can be concluded that total value of the threats is lower than the value of the opportunities: B = 108, R = 71, R < B.

Based on the results achieved and evaluation scale proposed, day surgery system in Slovakia can be described as a functional system limited by incorrect setting of certain individual components, as the opportunities outweigh the threats, but the weaknesses outweigh the strengths of the system.

Discussion

Although concept of day surgery was adopted extensively in several countries (Majholm et al., 2012; Wasowicz-Kemps, 1999; Punnonen, 2009), its implementation in Slovakia is still limited. On one hand, there is direct and indirect evidence of successful day surgery performance across relatively wide range of health care facilities in Slovakia, including achievement of its potential benefits supporting objectives of the governmental health policy. On the other hand, critical feedback on effectiveness and penetration of day surgery system can be detected (NHIC, 2012). Despite this discrepancy, to our best available knowledge, this is the first study aiming at scientific analysis of functionality of day surgery system in Slovakia.

To identify actual level of system dysfunctionality, multilevel SWOT analysis was used. Appropriateness and proper targeting of selected method is supported by conclusions of other researchers (McSherry and Warr, 2008) who recommend it as one of the tools in the process of day surgery system evaluation and development. As outcomes of day surgery system are primarily determined by the quality of surgical care and design of the system, negativistic formulation of the problem (dysfunctionality) was selected deliberately to highlight organizational issues.

Quality of surgical care is assumingly standard value that should only be influenced in a positive way in future by less and less invasive surgical interventions and improvements in anesthesiology protocols. This may not only improve postoperative course by faster and uneventful recovery but also extend the range of procedures suitable for day surgery. Another important point is safety of day care that is primarily dependent on the quality of surgical care and proper indications and patient selection (Šoltés and Radoňak, 2012). These issues, however, remained beyond the scope of this analysis.

Design of the day surgery system is a complex concept influenced by wide range of factors. As a result, conclusions derived from multilevel SWOT analysis may be at risk of bias due to selective expert panel composition. To limit this risk as much as possible, expert panel included medical, managerial and economical positions to assure as variable insight into the matter as possible. Identified strengths, weaknesses, opportunities and threats may sometimes appear overleaping but in fact they just reflect different points of views of principal stakeholders in day surgery system.

Pressure of health insurance companies along with significant reduction of healthcare costs were identified as principal strengths, further supported by introduction of modern information systems and availability of wide range of day

surgery procedures. Principal weaknesses included unstable contracts provided by insurance companies to specialized day surgery centres thus limiting their financial stability along with insufficient and vulnerable infrastructure for extensive day surgery performance, limited number of specialized centres and multimillion investments needed. These issues seem to be further complicated by demotivating reimbursement policy and inadequate legislative support. Improvement in prevention, diagnosis and treatment of chronic non-infectious diseases appears to be the leading opportunity allowing for larger proportion of patients to be included into day surgery care. Fundamental threat, as detected in this analysis, can be defined as failure to provide adequate financial coverage for day surgery infrastructure and implementation of projects aiming at its wider penetration into everyday practice.

Based on these results, significant deficiencies in the implementation of day surgery in Slovakia could be identified, describing the whole system as functional but limited by incorrect setting of certain individual components. Thorough economical evaluation of reimbursement policy is needed as current strategy represents significant barrier for development and wider spread of day surgery. Reimbursement, as specified by insurance companies at the moment, does not even cover minimum costs entitled to the procedure in certain cases, thus forcing health care providers to sponsor the loss from other activities to keep their share on the market. Regional characteristics, type and ownership of health care facilities as well as other socioeconomic conditions should also be taken into account when defining future financial coverage for day surgery.

One of the important issues to address in future is regional and public support for day surgery. Sufficient information about the day care options for particular diagnosis may improve compliance with the treatment and thus prevent possible tragic consequences of delayed interventions. From this point of view, functionality of the system is of utmost importance as dysfunctional system may subsequently cause dissatisfaction leading to further decrease in interest for day surgery. Proper functionality evaluation is essential to eliminate factors that imply adverse consequences on the whole system.

When discussing developmental barriers, demographic and social aspects of individual Slovak regions have to be considered due to pre-existing regional disparities. Some parts of the country are characterized by significantly limited transportation services, making it difficult to access day surgery providers. After surgery, effective postoperative monitoring is needed in order to eliminate adverse consequences of possible complications. Therefore, adequate home care (relatives, friends or hired medical personnel) and availability of communication means are necessary to provide relative safety during postoperative course. From

this point of view, social aspects in the context of living standard should also be noted, as striking differences can be observed among regions (taking Roma community into account).

Methodology of the study allowed for detecting significant limitations in the current functioning of the day surgery system. To obtain more precise information, subsequent analysis of the limiting components is needed in future to evaluate their actual importance, particularly in the parts of the system which are directly linked with strategy of health care providers (e.g. strategic principles, perspectives, objectives, benchmarks and initiatives). For this purpose, Analytic Hierarchy Process could be used as a flexible model for decision-making, based on hierarchy, priorities and consistency. This methodology could also serve as a starting point for development of strategic benchmarking for day surgery providers.

Conclusion

Based on the data presented, Slovak day surgery system can be described as functional concept limited by incorrect setting of particular components. Financial issues appear to be leading barrier of its development as current reimbursement policy is demotivating and further investments are needed to improve insufficient and vulnerable infrastructure. Attention should be paid to systematic analysis of feedback data by all important stakeholders involved in the field to provide validated arguments for systemic adjustments. Maintaining high standards of care and patient's safety have to remain principal goals while striving for more cost-effective surgical care.

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