



The Role of Individualized Analytical Reports in Managing a Medical Entity

Submitted: 28 July 2024; Accepted: 20 August 2024; Published: 20 September 2024

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Abstract

Introduction: *In the face of the increasing complexity of health care systems, growing competition and changing patient needs, modern health care facilities face the challenge of constantly improving management strategies and practices. A key element of this process is the use of precise, adequate, and effective analytical tools.*

Purpose of the work: *presenting the most important analytical instruments used in the practice of hospital management, their impact on financial efficiency and their importance for the decision-making process in the context of the medical sector.*

Material and methods: *Analytical tools used to improve the management process of a medical entity were analyzed in terms of their effectiveness.*

Results: *When examining the impact of analytical methods on the financial situation of medical facilities, it is important to focus on financial aspects, mainly related to the balance of costs and revenues. Public utility facilities operating within structures such as independent public health care facilities or budgetary units do not aim to generate profit.*

Conclusions:

1. *Hospital management must have tools that not only provide specific knowledge about the current situation, but also enable forecasting future trends and challenges.*
2. *Operational efficiency, financial profitability, and quality of services provided are just some of the areas where advanced analytical methods can bring significant benefits.*
3. *The effectiveness of analytical tools is closely related to the ability to interpret and implement them in management practice.*

Key words: *analytical tools, efficiency, finance, management*

Introduction

The management of a public healthcare entity is an extremely sophisticated task that requires not only medical knowledge, but also managerial, economic, and interpersonal skills, and the success of such an institution is dependent on many factors that are determined by the operational area of management. In this area, financial management by efficient and effective decision-making is the most strategic. This, in turn, is based on reliable information that the managers receive and which they process operationally in an appropriate manner by subjecting it to further management processes.

In the era of digitization and globalization, the healthcare sector is facing unique challenges. The growing amount of data, together with the increasing demand for medical services, enforces on healthcare entities an ongoing adaptation to the changing reality. In this context, modern management methods, such as the process approach, are becoming not only desirable but even necessary [1, 5]. They focus on analyzing, optimizing, and monitoring the entity's processes. In the healthcare sector, this applies not only to clinical efficiency but especially to financial efficiency. The key here is the identification of strategic financial processes, their analysis, and the introduction of management decisions based on them [9], which results in an increase in the quality of medical services provided and, consequently, an increase in financial efficiency.

In the context of the operational management of a medical entity, Max Weber's mechanistic concept of management is applicable [2]. It assigns the treatment entity the character of a machine consisting of hundreds of gears of different sizes, meshing against each other and putting each other into motion. The result of the activity is an efficient mechanism in which one gear wheel sets another in motion, and so on. The machine is efficient and productive. On the other hand, if one cogwheel fails, it prevents the next cogwheel from moving and so on. The effect is then the opposite. The machine fails, and ultimately stops working. Transferring the image of the machine described above to the management of a medical entity shows that the gears working together are the areas of operational management in a medical entity.

They are the organizational units of the entity working together inextricably. By putting each other in motion, they obviously affect financial efficiency and the clinical efficiency that accompanies it inextricably. The driving source of these is the information resulting from data analysis [3], which allows appropriate management decisions to be made (Fig.1).

Figure 1. Max Webers mechanistic concept in a medical entity



From the point of view of operational management, Max Weber's mechanistic concept of management—through its obvious impact on financial efficiency and clinical efficiency—affects the organizational efficiency of the treatment entity globally [12, 16]. As Weber suggests, bureaucracy, with its mechanistic nature, is a symbol of efficiency and rationality, which are inseparable from the healthcare system and, consequently, the efficient and professional management of medical entities. In the face of the growing complexity of health systems, increasing competition, and evolving patient needs, modern medical entities face the challenge of constantly improving their management strategies and practices. A key component of this process is the use of accurate, relevant, and effective analytical tools. Health systems around the world are witnessing rapid change – technological, demographic, as well as economic. In this dynamic environment, the management of healthcare entities must have tools that not only provide concrete knowledge of the current situation, but also enable forecasting future trends and challenges.

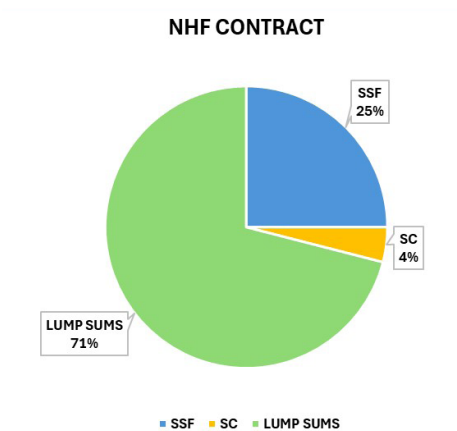
Today's analytical tools are crucial in identifying areas in need of intervention, but also in realizing the potential hidden in the available resources. The collected data and information of all types in the IT resources of health-care entities and information reach incredible capacities up to terabytes. The analysis of this data, although feasible, is often archaic when presented to the manager to assess the situation of the entity, which delays the management decision-making process, and may ultimately cause irreversible financial consequences.

To meet the needs arising from the necessity to improve the financial management of a medical entity, individualized analytical tools had to be created that would dynamically depict the situation „here and now“, reflecting the real picture of a particular medical entity at a given moment. The distinctive feature of these tools are the data, which will be extracted from operating programs functioning in the system [e.g. ICM (SZOI), IMPULS, MEDICUS] and transferred to a separate application, where – after automatic processing – they will be implemented into an analytical report depicting reality in real time, „here and now“. Thus, the managers must have knowledge of what information they want to obtain and, consequently, how to manage it [6, 7, 11]. When characterizing analytical tools in the practice of management of medical entities, it should be stressed that the analysis and evaluation of the activities of these entities is a complex issue, taking into account many factors. A significant part of this complexity can be attributed to the various goals that are set for these institutions. When examining the impact of analytical methods on the financial health of medical institutions, it is essential to focus on financial aspects, mainly related to the balance between costs and revenues. It is worth emphasizing that public facilities, operating under structures such as independent public healthcare institutions or budget-funded units, do not aim to generate profit. Nevertheless, this does not relieve them from being concerned about efficiency and avoiding excessive losses. Financial goals should support strategic objectives that focus on the most efficient healthcare possible [8]. The strategic priorities defined in this way should be implemented through financial goals, which imply wise management of available resources and generation of surpluses that

can be used for development, ultimately contributing to the main task of the healthcare entity.

Figure 2 illustrates the structure of a treatment entity's NHF contract. In addition to numerical data, individualized analytical reports also have the ability to present these data in visualization terms, which stimulates the reader's imagination and allows for intuitive analysis.

Figure 1. The National Health Fund contract of a treatment entity



This diagram shows that 71% of the treating entity's NHF contract is BHC [Basic Hospital Cover] lump sum, which includes inpatient, primary care services. A portion of the contract is 25% is Health Services Separately Funded [SSF], among them paid up to the amount of performance after settlement by the NHF. These include e.g., drug programs, chemotherapy, oncologic surgery, computed tomography. Only 4% of the contract are Supplementary Contracts [SCs], which are all those paid up to the applicable limit such as breast cancer prevention and neurorehabilitation.

Table 1. Report – Analysis of revenues from the National Health Fund in individual contract groups of 1st half of 2023 [depersonalized data]

Name of the range of services	Limit	Excursion	Non-excursion	Overexcursion	% of excursion up to the limit	not reported to ICM	% reported to ICM	Execution for invoicing (without overexcursion)	Invoices	ICM invoices	ICM invoice report	Uninvoiced to limit	Not invoiced until full performance
Lump sum	49 445 172	51 099 648	0	1 654 475	103,3%	952 524	98,10%	0	49 445 172	49 445 172	0	0	652 521
SSF1	3 367 542	3 845 257	-3 161	489 876	114,20%	34 615	99,1%	3 364 381	3 440 254	3 440 253	1	-75 873	405 003
SSF2	561 493	738 787	0	177 294	131,6%	-483	99,93%	561 493	561 226	561 226	0	0	177 561
SSF3	329 563	453 481	0	123 917	137,6%	0	100,00%	329 563	327 111	327 111	0	2 452	126 369
SSF13	219 006	0	-219 006	0	0,0%	0	---	0	0	0	0	0	0
SSF4	1 656 006	1 833 986	-1 801	179 782	110,7%	561	99,97%	1 654 204	1 653 602	1 653 596	6	603	180 384
SSF5	148 397	214 422	-53	66 061	144,5%	0	100,00%	148 362	148 310	148 310	0	52	66 112
SSF7	1 844 148	1 844 148	0	0	100,0%	-750	100,04%	1 844 148	1 844 148	1 844 148	0	0	0
SSF8	2 038 697	2 038 697	0	0	100,0%	-197	100,01%	2 038 697	2 038 697	2 038 697	0	0	0
SSF9	388 120	489 110	0	100 989	126,0%	710	99,85%	388 120	388 064	388 063	1	57	101 046
SSF10	752 795	801 002	0	48 207	106,4%	607	99,92%	752 795	752 156	752 155	0	639	48 846
SSF11	192 940	307 616	-7	114 683	159,4%	0	100,00%	192 933	192 915	192 917	-1	18	114 701
SSF12	6 077 516	6 163 953	-52 210	138 648	101,4%	80 939	98,69%	6 025 305	6 012 428	6 012 428	0	12 877	151 525
SSF TOTAL	17 576 223	18 730 458	-276 220	1 430 456	106,6%	116 969	99,38%	17 300 003	17 358 911	17 358 904	7	-58 900	1 371 547
SC1	329 554	418 100	0	88 547	126,9%	-126	100,03%	329 554	329 412	329 412	0	141	88 688
SC2	79 342	233 600	0	154 258	294,4%	0	100,00%	79 342	75 621	75 621	0	3 721	157 979
SC3	241 396	357 060	0	115 664	147,9%	80	99,98%	241 396	240 946	240 947	0	450	116 114
SC4	255 933	49 491	-206 442	0	19,3%	0	100,00%	49 491	0	-49 491	-49 491	0	49 491
SC5	127 627	213 235	-22 800	108 408	167,1%	0	100,00%	104 827	104 176	104 175	0	651	109 059
SC6	1 399 862	2 274 115	-190 284	1 064 536	168,5%	0	100,00%	1 209 579	1 196 579	1 196 579	0	13 000	1 077 536
SC TOTAL	2 433 714	3 545 601	-419 526	1 331 412	148,7%	-46	100,00%	2 014 189	1 946 734	1 946 225	-49 491	67 454	1 398 867
SSF+SC TOTAL	20 009 937	22 276 059	-695 746	2 961 868	111,3%	116 923	99,48%	19 314 191	19 305 646	19 355 129	-49 484	8 546	2 970 414
ALL NHF CONTRACTS IN TOTAL	69 485 110	73 375 707	-695 746	4 616 343	105,6%	1 088 497	98,52%	19 314 191	68 750 818	68 800 302	-49 484	8 546	3 622 935

Source: own elaboration.

The analytical report aggregated to Table 1 presents an analysis of revenues from the National Health Fund in individual contract groups mentioned above, i.e. lump sum, health services separately funded/separately funded services, additional contracts. The analytical report indicates the amounts of the limit allocated to the medical entity in each contract group. Based on the aggregated to the individualized report data from the ICM system [Information Circulation Management System] and appropriately processed, the results obtained show in real time the amounts of contract execution, the amounts of non-execution, the amounts of over-execution and, most importantly, the percentage of contract execution to the limit allocated to the medical entity and the applicable limit. The information provided by the analytical report to the management of the medical entity will allow quick and effective decisions resulting in rational management of areas requiring increased or reduced management activity. The report illustrates in a real place and time the status of contract implementation, and thus the financial side of the whole process.

Table 2. Report – Share of costs in revenue of 1st half 2023 [depersonalized data]

NO	Name of organizational unit	Total revenue	Total cost (PLN)	%	Cost of medicines (PLN)	%	Cost of materials (PLN)	%	Cost of labor (PLN)	%	Cost of labor (civil law-mandate contracts) (PLN)	Cost of labor (contracts) (PLN)
1.	Dept. 3	3 580 768,17	4 457 443,96	124,48	203 491,93	5,68	58 717,08	1,64	2 442 511,60	68,21	2 442 511,60	----
2.	Dept. 2	2 684 617,22	3 407 006,69	126,91	153 546,08	5,72	75 108,02	2,80	1 951 844,32	72,70	1 301 539,80	650 304,51
3.	Dept. 6	6 439 549,33	7 143 208,96	110,93	824 707,48	12,81	306 703,54	4,76	4 455 235,16	69,19	2 591 440,46	1 863 794,70
4.	Dept. 1	3 343 063,23	4 629 647,90	138,49	221 953,17	6,64	99 181,35	2,97	2 568 340,15	76,83	2 274 627,67	293 712,49
5.	Dept. 4	6 043 560,10	8 517 947,69	140,94	232 681,50	3,85	166 202,86	2,75	4 460 583,62	73,81	4 141 859,20	318 724,43
6.	Dept. 7	6 012 428,06	8 590 128,64	142,87	62 594,96	1,04	73 852,27	1,23	4 832 962,49	80,38	4 180 341,82	652 620,67
7.	Dept. 5	6 034 560,05	10 371 283,33	171,86	454 441,52	7,53	164 610,89	2,73	4 223 578,28	69,99	3 074 881,57	1 148 696,71

Source: own elaboration.

Table 2 illustrates the share of costs in the revenue of the medical entity of the first half of 2023. For the purpose of the study in question, drug costs, material costs, labor costs broken down into employment and mandate contracts, as well as contracts for specific work were used. In the breakdown by organizational unit, the obtained results show the percentage share of costs in total revenues, while the analysis conducted clearly shows the highest share of labor costs in revenues [80.38%]. The individualized report recommends to the management of the treatment entity to implement measures for effective human resources management, including rational employment policy and optimization of labor costs associated with them.

Table 3. Report – Analysis of revenue and costs per man-day of 1st half 2023 [depersonalised data]

NO	Name of organizational unit	Revenue per man-day (PLN)	Mon day cost (PLN)	Cost of medicines and blood per man-day (PLN)	Cost of materials per man-day (PLN)	Other costs per man-day (PLN)	Labour cost per man-day (PLN)	Number of man-days	Total revenue (PLN)	Total costs (PLN)	Cost value to calculate man-day (PLN)
1.	Dept.3	1 079,99	1 071,12	61,37	17,71	194,20	736,68	3 316	3 580 768,17	4 457 443,96	3 551 350,82
2.	Dept.2	816,71	818,42	46,71	22,85	148,49	593,79	3 287	2 684 618,22	3 407 006,69	2 690 062,37
3.	Dept.6	4 388,03	3 815,99	561,97	208,99	280,56	3 035,88	1 468	6 439 549,33	7 143 208,96	5 600 062,37
4.	Dept.1	805,31	875,57	53,47	23,89	162,31	618,69	4 151	3 343 063,23	4 629 647,90	3 634 740,23
5.	Dept.4	639,85	733,73	24,63	17,60	125,86	472,26	9 445	6 043 560,10	8 517 947,69	6 930 293,36
6.	Dept.7	507,61	615,24	5,28	6,24	98,48	408,03	11 845	6 012 428,06	8 590 128,64	7 287 231,28
7.	Dept.5	1 673,78	1 633,25	129,17	46,79	1 138,64	1 200,47	3 518	5 888 817,32	10 371 283,33	5 746 203,85
8.	Subdivision1	---	2 583,79	112,28	65,34	505,96	1 997,30	1 754	---	5 732 255,97	4 532 980,30

Source: own elaboration.

The analysis of revenue and costs per man-day in the first six months of 2023 is shown in Table 3. The data aggregated for it by individual organizational units of the treatment entity refer to the amount of revenue per man-day and costs per man-day. For the purposes of the research, data regarding drug and blood costs, material costs, other costs, and labor costs were assumed. The processed data indicated by the individualized analytical report revealed the highest costs calculated per man-day, which are labor costs. This sends a clear message to the management of the healthcare provider that cost optimization measures need to be taken in this area.

Table 4. Report – Summary of costs and revenues of primary activity units of 1st half 2023 [depersonalised data]

Name of organisational unit	1st half 2023			
	Cost	Revenue	Result	Revenue profitability
Dept.1	4 629 647,90 zł	2 243 063,23 zł	-1 286 584,67 zł	38,49%
Dept.2	3 407 006,69 zł	2 684 618,22 zł	-722 388,47 zł	26,91%
Dept.3	4 457 443,96 zł	3 580 768,17 zł	-876 675,79 zł	24,48%
Total Departments 1-3	12 494 098,55 zł	9 608 449,62 zł	-2 885 648,93 zł	30,03%
Dept.4	8 517 947,69 zł	6 043 560,10 zł	-2 474 387,59 zł	40,94%
Subdivision1	5 732 255,97 zł	0,00 zł	-5 732 255,97 zł	0,00%
Lab.1	4 171 455,41 zł	8 938 739,09 zł	476 728 368,00 zł	53,33%
Lab.2	8 811 964,86 zł	19 041 806,34 zł	10 229 841,48 zł	53,72%
Total Departments 4-9	27 233 623,92 zł	34 024 105,53 zł	6 790 481,61 zł	19,96%
Dept.5	10 371 283,33 zł	6 034 560,05 zł	-4 336 723,28 zł	71,86%
Dept.6	7 143 208,96 zł	6 439 549,33 zł	-703 659,63 zł	-10,93%
Dept.7	8 590 128,64 zł	6 064 638,48 zł	-2 525 490,16 zł	-41,64%
Dept.8	2 086 618,06 zł	1 444 128,63 zł	-642 489,43 zł	-44,49%
Total Hospital	67 918 961,46 zł	63 615 431,65 zł	-4 303 529,81 zł	-6,76%
Opd.1	731 808,94 zł	717 536,69 zł	-14 272,25 zł	-1,99%
Opd.2	227 978,20 zł	185 548,97 zł	-42 429,24 zł	-22,87%
Opd.3	548 124,01 zł	539 043,81 zł	-9 080,20 zł	-1,68%
Opd.4	242 433,37 zł	324 487,40 zł	82 054,03 zł	25,29%
Opd.5	354 314,71 zł	285 282,94 zł	-69 031,77 zł	-24,20%
Opd.6	2 497 399,65 zł	2 492 914,64 zł	-4 485,01 zł	-0,18%
Total Outpatient				
Department	4 602 058,88 zł	4 544 814,45 zł	-57 244,44 zł	-1,26%
ED	4 682 069,19 zł	3 916 369,55 zł	-765 699,63 zł	-19,55%
SURG. DEPT.1	26 577,97 zł	25 706,64 zł	-871,33 zł	-3,39%
SURG. DEPT.2	429 720,85 zł	488 208,41 zł	58 487,56 zł	11,98%
SURG. DEPT.3	460 729,99 zł	449 171,21 zł	-11 558,78 zł	2,57%
Total NHF Programmes	917 028,81 zł	963 086,27 zł	46 057,46 zł	4,78%
Total NHF activity	78 120 118,34 zł	73 039 701,92 zł	-5 080 416,42 zł	6,96%

Source: own elaboration.

A summary of the costs and revenues of the primary activity units in the first half of 2023 is shown in Table 4. The individualized analytical report by the name of the organizational unit of the treatment entity generates data regarding revenues, costs, financial result, and break-even revenue. The report shows that the costs generated by the treatment entity significantly exceed the revenues generated, causing a negative financial result and indicating the fact that the entity is underfunded. This in turn translates into the profitability of revenues, which in the present case globally for the NHF activity, which reaches the threshold of -6.96%. The report demonstrates to the management of the healthcare entity that it is necessary to take measures aimed at generating a revenue while optimizing costs, which is a particular perpetuum mobile for the entity. This is because these actions have to be proportional to the limits allocated to the healthcare provider. Therefore, it may be necessary to implement such operational activities in the entity, which will meet the legal prerequisites to change the amount of the lump sum granted by the NHF.

Discussion

Each of the analytical tools presented, when used in an appropriate manner, can contribute significantly to improving the effectiveness of the financial management of healthcare entities, and hence the quality of medical services provided. However, their effectiveness depends on the skills and competences of the management and their adaptation to the specifics of a given institution. Hence their individualized nature.

The use of analytical reports in the management practice of public hospitals, where they are widely used, is important. In many public hospitals, data are collected in different systems, making them difficult to analyze and interpret. Dynamic analytical reports allow these data to be integrated in one place, which in turn allows for a more holistic approach to analyzing the information. This enables the management to quickly identify areas that require intervention. Individualized analytical reports also enable modelling and creating forecasts based on the available data. This can include, for example, the predicted demand for hospital beds over specific periods or cost

forecasting. One of the main strengths of analytical reports is also the ability to present data in visual form. Interactive graphs and charts help to make sense of complex data and draw concrete conclusions from them. The analysis of data from analytical reports can also help to identify areas where the quality of care is not at an adequate level, which in turn allows rapid action to improve it. By providing accurate, up-to-date data and analysis, reports are a valuable tool to support decision-making at a strategic level [4, 10]. Individualized analytical reports in healthcare entities are not only a tool for data collection and analysis, but also a key element in the decision-making process. They make it possible not only to respond to current challenges, but also to plan for the future and shape the strategy of organization development. However, fully exploiting their potential requires advanced knowledge and skills on the part of the management and constant adaptation of the tools to the changing needs and conditions of the hospital. Integration of diverse data sources is also important here. Analytical tools make it possible to consolidate data from different systems and databases. Their undoubted advantage is also the automation of reporting. Instead of relying on manual report generation, the process becomes automated, saving time and reducing the risk of errors.

The subject of revenue and cost management in a healthcare entity is complex, dynamic, and multidimensional, requiring not only in-depth economic knowledge, but also an understanding of specific functioning of the healthcare sector [13, 15]. In the individualized analytical reports presented, the focus is on the key elements and challenges of related to operational financial management in the context of health entity management. Their utility value is indisputable and directly influences financial efficiency.

The individualized analytical reports have immediate practical application.

The financial aspects within the management of healthcare entities are an inseparable part of every decision and strategy, determining in many cases the direction and scope of activities. Operational revenue and cost management in such a setting is not just a cold economic calculation, but becomes one of the foundations on which the quality and availability of health services are based [14, 16]. The relevance of precise, informed, and effective financial

management in healthcare entities gives rise to the responsibility that these institutions have toward patients and, ultimately, toward society as a whole.

Conclusions

Analytical tools have a fundamental and direct impact on financial efficiency and thus on the effective management of the healthcare entity. When examining the impact of analytical methods on the financial health of healthcare facilities, it is crucial to focus on the financial aspects, mainly related to the balance between costs and revenues. Public facilities, operating within structures such as independent public healthcare institutions, companies, or budget-funded entities, do not aim to generate profit. Nevertheless, this does not exempt them from being concerned about efficiency and avoiding excessive losses. Financial goals should support strategic objectives that focus on the most efficient healthcare. Individualized analytical tools, by influencing the financial efficiency of the healthcare provider, also shape clinical efficiency. Their distinctive feature is their immediate implementation and application in practice.

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