

RESEARCH ARTICLE

Considerations regarding the attitude of medical staff towards administrative risks within the Pathology Department

Aurora Maria Popa¹, Bianca Andreea Lazar^{2*}, Liviu Onoriu Marian¹, Ovidiu Simion Cotoi^{2,3}, Septimiu Voidăzan⁴

1. Faculty of Mechanical Engineering, Technical University of Cluj-Napoca, Romania

2. Pathology Department, Mures Clinical County Hospital, Targu Mures, Romania

3. Department of Pathophysiology, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania

4. Department of Epidemiology, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania

Objective: In the context of public health, there is a common misconception that only Romania's system faces issues and generates societal dissatisfaction. However, globally, there is significant room for improvement, as the performance of the sector is often unsatisfactory. This paper presents findings from an exploratory study on the attitudes of medical personnel in pathology services towards managerial and administrative risks, supported by a survey that provides a wealth of useful information.

Methods: The survey encompassed a geographic area including the counties of Mureș, Harghita, Sibiu, and Alba, involving 12 healthcare units: 2 university hospitals, 2 county hospitals, and several municipal or town hospitals. These institutions housed anatomical pathology service structures staffed by approximately 240 physicians and assistants, with a ratio of 1 physician to 2.5 assistants. The questionnaire aimed to test four hypotheses through questions that invited respondents to select from formatted answers.

Results: Of the four hypotheses formulated and their corresponding items, only two were confirmed. This outcome suggests that the Romanian healthcare system is not unequivocally adaptable to the needs of medical product consumers. Specifically, the data indicate that hospitals face dire financial conditions amidst various challenges and vulnerabilities.

Conclusion: Differences of opinion between the two categories of respondents are evident in certain risk categories. This discrepancy arises from the specific nature of their activities and their respective contributions to ensuring the quality and efficiency of the service.

Keywords: health care risk, risk management in hospitals, risk management in pathology services

Received 25 May 2024 / Accepted 26 June 2024

Introduction

The current period is marked by significant social and economic challenges, with rapid and often unpredictable changes affecting citizens globally. These changes inevitably lead to confusing, painful, and traumatic situations that managers are obligated to handle with great responsibility. In the context of public health, there is a misconception that only Romania's healthcare system faces issues and generates societal dissatisfaction. However, there is room for improvement in the global community, as the performance of the sector is frequently unsatisfactory [1-3]. This situation is exacerbated by the tension between a conservative outlook among some medical personnel and a contemporary managerial approach that views health organizations as systematic institutions. These institutions are characterized by clearly defined objectives, components, functions, and purposes. Most importantly, they must achieve outcomes that are proportionate to the resources allocated by society. Even in well-developed countries, where substantial expenditures are made in the healthcare system, the efficiency and effectiveness of such organizations remain limited. An upward spiral of costs is observed, along with a

lack of concern for the primary objective that should govern these systems: patient satisfaction [4-5].

Pathology departments play a crucial role in managing diseases that have yet to find satisfactory medical solutions for patients. Although pathologists do not interact directly with patients, their services can significantly contribute to the satisfaction of the primary stakeholders for whom the healthcare system exists. Enhancing performance and preventing or eliminating undesirable events are fundamental aspects of modern management. In Romania, the perception of managerial tasks, responsibilities, and performance is considered similar across various healthcare settings, including medical offices, outpatient clinics, hospitals, and other public health institutions [6-8].

We often emphasize the roles of doctors, nurses, health technicians, and other medical staff as the true driving force of healthcare institutions. They are relatively well aware of certain clinical risks generated by undesirable events during medical procedures. However, we overlook the fact that increasingly complex medical processes, continuously modernized and coordinated by expensive IT programs, cannot be properly managed without the contributions of other personnel categories. These individuals, engaged in administrative activities, have roles and responsibilities

* Correspondence to: Bianca Andreea Lazar
E-mail: ohii.bianca@yahoo.com

that significantly impact the final outcomes of the healthcare institution [9-10].

Neglecting or downplaying the significance of these processes results in reduced technical performance and overall quality, leading to increased costs, delays in interventions, and longer treatment durations. These outcomes are perceived as dissatisfactory by patients.

Studies have depicted eight risk domains of enterprise management. The areas of managerial risk in public health are described as followed: operational, clinical/patient safety, strategic, financial, human capital, legal/regulatory, technology, hazard. Although the risks associated with administrative activities in health facilities have been extensively documented in various papers [1-4], they are unfortunately not widely recognized, and research on the topic at both national and global levels is limited [11-16].

The work of Chiozza M deserves mention for its emphasis on hospital risk management activities that promote a proactive approach to ensuring top-level patient safety. Since 2008, FEMA has been introduced as an ISO-approved method for identifying, classifying, and mitigating risks in medical laboratories, addressing concerns about service quality that impact patient trust. While the focus is primarily on human errors in hospital operations, the work also provides guidance on applying this method to mitigate risks specific to administrative activities [17,18].

The survey aims to accurately capture employee perspectives within the pathology service on events that pose specific risks related to economic, legislative, and human resource activities. The research objectives focus on identifying and categorizing the primary issues that could lead to administrative risks, assessing how economic risks impact medical service performance, evaluating knowledge levels of administrative risk legislation, and quantifying divergent opinions among respondent groups regarding administrative risks.

Materials and Methods

The study was conducted across the geographic area covering Mureș, Harghita, Sibiu, and Alba counties, encompassing 12 healthcare facilities. These included 2 university hospitals, 2 county hospitals, and the remaining municipal or town hospitals, all equipped with anatomical pathology services. The services were staffed by approximately 240 physicians and assistants, maintaining a real ratio of 1 physician to 2.5 assistants. A total of 160 responses were collected for the study, comprising 48 from physicians and 112 from assistants, reflecting the service profile accurately. This represented 66% of the total personnel in these services.

The questionnaire was designed to test four hypotheses, each featuring items where respondents selected answers from pre-formatted options. Certain questions categorized administrative risks into four levels (minor, significant, major, critical), while others assessed the frequency of these risks in current service activities. All questions were man-

datory. Data were collected and organized using Microsoft Excel, and statistical analysis was conducted using SPSS 22 and GraphPad Prism 8. The results obtained are considered significant and merit attention from leaders in these hospital healthcare units.

The hypotheses formulated for this research are:

- Hypothesis 1. The predominant undesirable events that lead to risks are primarily economic in nature, as confirmed through evaluation of four specific items
- Hypothesis 2. The reporting of activities via the DRG system introduces inaccuracies in depicting the actual work carried out, as confirmed by assessment across four items.
- Hypothesis 3. Medical staff are largely unaware of legislative risks, as indicated by findings from eight specific items.
- Hypothesis 4. Insufficient oversight of medical staff and their administrative activities leads to significant or critical managerial risks, as confirmed by findings from six specific items.

Results

Hypothesis 1

The majority of risks that pose undesirable events in pathology services are predominantly economic in nature. When respondents classified administrative risks using four predefined categories, eight managerial risks were identified. Their percentages justify categorizing them as minor risks: inadequate computerization, lack of document management procedures, legislative inaccuracies, insufficient training in event prevention, inadequate management of healthcare units, inadequate occupational health and safety measures, and inadequate equipment.

It's important to note that funding shortages, initially classified as minor to significant risks, were reassessed following the analysis of other survey items and determined to be a significant risk. This underscores the necessity of regularly assessing the financial health of the system to prevent operational disruptions due to inadequate resources for specific needs (Table I).

Respondents identified the lack of qualified personnel (Table II) as the primary factor contributing to undesirable events, categorized as a critical risk. According to established risk management procedures, addressing this issue necessitates a realistic, flexible, and continuously adaptive personnel policy that can effectively respond to both internal challenges and external changes within the system.

Another aspect assessed within the same hypothesis pertained to the risk of insufficient funds for material procurement (Table III). Among the 160 respondents, 17 indicated "very often" occurrences (13 physicians and 4 assistants), representing 10.62% of the total. This disparity between physician and assistant responses was statistically significant. Additionally, 17 respondents (8 physicians and 9 assistants) reported occurrences as "often," while a substantial majority of 126 respondents (27 physicians and 99

Table I. Risk due to lack of financing

Risk due to lack of financing					
Weighted categ.	%	Classification / no. respondents	Framing no. respondents/group		p value
			Physicians	Assist.	
1	0-24	87	12 (25,0%)	75 (66,9%)	0.0001
2	25- 49	59	28 (58,3%)	31 (27,6%)	0.0004
3	50 -74	14	8 (16,6%)	6 (5,35%)	0.04
4	75-100	0	0	0	-
Total		160	48	112	

Table II. The risk due to inadequate staffing of the service

Risk Due to Lack of Adequate Staff for the Service				
Weighted categ.	%	No. of respondents	No. of respondents/group	
			Physicians	Nurses
1	0-24	70	40	30
2	25 - 49	40	8	32
3	50 - 74	50	0	50
4	75 - 100	0	0	0

Table III. Is there a risk of not having funds for material procurement

The risk of not having funds for the purchase of materials					
Function	Physician		Assistant		p value
	Number	Percent (%)	Number	Percent (%)	
Very often	13	27,1	4	3,6	0.0001
Frequently	8	16,6	9	8,0	0.18
Rare	27	56,3	99	88,4	0.0001
Rarely	0	0,0	0	0,0	-
Does not exist	0	0,0	0	0,0	-
Total	48	100	112	100	

assistants) categorized these events as “rare,” constituting 78.75% of the total responses. Once more, the difference in responses between physician and assistant categories was statistically significant ($p=0.0001$).

Based on the processed data, it can be concluded that many respondents perceive the risk of insufficient funds for material procurement as rarely jeopardizing the functioning of healthcare units. This categorization as a minor risk contradicts the formulated hypothesis.

Hypothesis 2

Based on the analysis of responses from the survey data, it is evident that the reporting method of activities through the Diagnostic Related Groups (DRG) system indeed creates inaccuracies in reflecting the actual work performed, as verified by four specific items.

Firstly, regarding the risk that DRGs related to the service do not adequately reflect the complexity and difficulty of interventions performed, a significant majority categorized their responses as “often.” Specifically, 36 physicians (75%) and 93 assistants (83%) fell into this category, indicating a non-significant relationship between staff categories ($p = 0.33$). However, a notable difference was observed in the “very often” category, where 5 physicians (10.4%) and 2 assistants (1.8%) indicated a more frequent occurrence ($p = 0.04$), highlighting a significant disparity among medical staff.

Moreover, in terms of responses categorized as “rare” and “very rare,” 7 physicians (14.6%) and 11 assistants (9.8%) fell into the former, while 6 assistants (5.4%) fell into the latter category. Importantly, a substantial majority—41 physicians (85.4%) and 95 assistants (84.2%)—confirmed the presence of significant risk, aligning with the formulated hypothesis.

Additionally, concerning the risk that funds allocated by the Health Insurance Fund (CAS) through DRGs may not accurately represent activities performed, respondents categorized this as a significant risk. Similarly, the involvement of medical and administrative staff in causing inaccuracies in DRG billing documents (Figure 1) was also perceived as posing a significant level of risk.

These findings underscore the conclusion that the DRG reporting system does introduce inaccuracies in depicting the actual work performed, validating the initial hypothesis based on comprehensive survey responses.

The item indicating the risk that certain activities conducted by the pathology service may not be accurately reflected in the DRG typology reimbursed by the Health Insurance House is categorized as presenting a minor risk level. This finding supports hypothesis 2, confirming that the DRG coding system for the service’s activities is deficient, incomplete, and contributes to a misleading portrayal of the work performed by service personnel.

Hypothesis 3

Based on the processed responses, legislative risks are largely perceived as minimal and overlooked by medical staff, as verified across four items where all 160 interviewees categorized legislative risk similarly. These items addressed risks stemming from the absence of specific administrative procedures within the pathology department, legislative inaccuracies, lack of training in event prevention specific to administrative activities, and insufficient prevention measures for patient safety incidents (PSI) and occupational safety and health (SSM), all of which were considered minor risks.

While these categorizations may appear superficial, they are substantiated by established work procedures, ongoing administrative activities, periodic training sessions, and discussions in work meetings focused on identifying and mitigating events that could negatively impact service performance. Legislative inaccuracies are infrequently identified and typically recognized only by individuals with min-

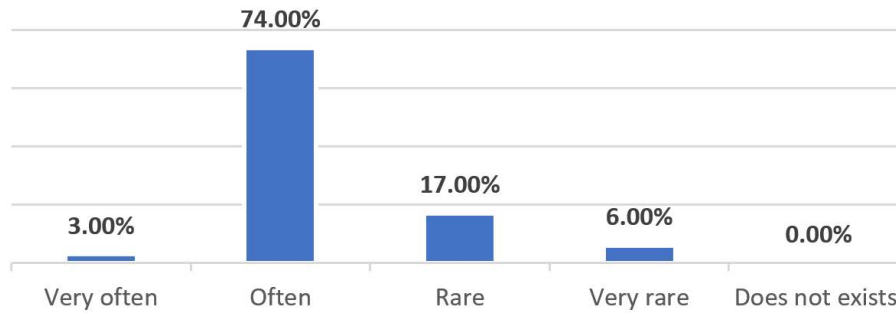


Fig. 1. The risk of inadvertence regarding the DRG settlement documents due to the medical and administrative staff involved

imal legal training. Specific measures for PSI and SSM are consistently managed by specialized hospital staff.

Regarding the risk associated with not having or adhering to specific service performance indicators, 28 physicians (58.3%) and 99 assistants (88.4%) viewed this risk as “rare.” There was a notable disparity in opinion between physicians and assistants, with assistants expressing higher concern.

The item concerning the correlation of legislation with job descriptions indicated that a significant majority of respondents, 148 out of 160 (92.5%), including 107 medical assistants (95.5%) and 41 physicians (85.4%), perceived this correlation as present in job descriptions, categorizing it as a minor risk. This finding did not support the hypothesis that legislative risks are largely unknown or ignored.

In terms of periodic training on clinical and managerial risks complying with legal norms, responses varied. However, a majority, 73% of respondents, indicated that such training sessions very rarely fail to comply with legal norms.

Finally, regarding the completion of documentation on managerial risks according to current regulations, 28 physicians (58.3%) and 97 assistants (86.6%) affirmed that such documentation is completed correctly in accordance with legislation.

These findings underscore the nuanced understanding and management of legislative risks within the pathology service, reflecting both awareness and adherence to legal norms in administrative practices and training.

Hypothesis 4

Based on the analysis of responses from the survey data, it is evident that the insufficient medical staff and their administrative activities indeed pose significant or critical managerial risks, as verified through six specific items.

Firstly, regarding the risk due to inadequate staffing, responses were categorized as follows: 70 respondents (40 physicians and 30 assistants) perceived this as a minor risk (0–24%); 40 respondents (8 physicians and 32 assistants) categorized it as a significant risk (25–49%); and 50 assistants categorized it as a critical risk (50–74%). This analysis clearly confirms that inadequate staffing presents a significant to critical risk, aligning with the initial hypothesis.

Secondly, the item concerning professional training categories indicated that 70% of respondents held medium training, with physicians comprising the remaining 30%. This distribution underscores the importance of both professional categories in the study.

Thirdly, regarding risks due to faulty management, 35 physicians identified this as a significant risk, whereas 87 assistants categorized it as a minor risk.

Fourthly, the item addressing the exceeding of specific consumptions was confirmed by 34 physicians (70.8%) and 96 assistants (85.7%), categorizing it as a critical risk. This highlights the necessity for establishing realistic stock sizing policies and tracking the causes of waste.

Fifthly, deficiencies in archiving service-specific documents—impeding comprehensive statistical data processing—were noted by 140 respondents (out of 160) as presenting a significant risk. Respondents suggested that this could be mitigated through document digitization and the creation of relevant statistics databases for each disease and procedure.

Lastly, respondents in leadership roles—6 physicians and 5 assistants—did not differ significantly in their opinions on surveyed issues compared to their respective respondent categories.

In conclusion, the survey findings underscore significant concerns regarding insufficient medical staff and related administrative activities, highlighting critical areas for improvement in management practices and resource allocation within the pathology service.

Discussion

Out of the four hypotheses formulated along with their corresponding items, only 2 were substantiated, indicating that the Romanian healthcare system lacks certainty as a perfectly adaptable system to meet the needs of medical product consumers. Specifically, the data obtained highlight the dire financial situation of hospitals amidst numerous challenges and vulnerabilities.

Fisher et al. noted in their paper that while some administrative and human resources risks were analyzed, there was a lack of investigation into their origins, evolution, and consequences [19–22]. Furthermore, significant errors in managerial risk analysis in hospitals arise from incomplete definitions of causative factors and deviations from initial

plans [23,24]. The paper suggests, without detailed argumentation, that neglecting the consequences of administrative and managerial risks severely impacts healthcare system budgets. Effective management practices, less reactive to internal changes, directly influence the costs and medical outcomes that define the health system.

Other authors have explored risk theory, the circumstances under which adverse events occur, methods for perception, prevention, and real-time action. They also delve into topics such as hospital budgeting, institution-specific information systems, and cash flow management [25,26].

Organizational performance indicators have been evaluated using specific methods in Chinese hospitals, focusing on financial, strategic, procurement, and integration risk areas [27].

The Diagnostic Related Groups (DRG) system exhibits significant deficiencies requiring improvements such as staff training, accurate activity reporting, and adaptation to department-specific requirements. While awareness of legislative risks among medical staff is not identified as a major risk, measures like periodic training and participation in professional courses are recommended to mitigate potential risks.

Criticism has been directed at the impact of risk management, governance, and information factors on hospitalized patients [28,29]. Essila J.C. addressed the prevalent issue of reducing procurement and storage costs for commonly used medical devices in hospitals [30].

Regrettably, Romanian research in these areas remains deficient, with the primary causes unidentified at the national level. Vlădescu C. et al. presented findings from a national commission that analyzed and proposed policies in Romanian public health, highlighting numerous detrimental conditions within the system that significantly impair the performance of healthcare organizations, especially hospitals—the primary healthcare providers in Romania. They outlined six intervention domains aimed at rectifying the dysfunctional aspects of the healthcare system: financing, organization, hospital care, drug management, primary care, and human resources. These problematic domains contribute to patient discomfort and dissatisfaction, markedly reducing access to medical services and quality assurance [31,32].

Voinea L. emphasized the critical need to enhance the quality of medical services in Romanian hospitals as a fundamental prerequisite for achieving both medical and economic performance. Without a comprehensive analysis of managerial quality in Romanian hospitals, the authors argue that only an integrated management approach encompassing economics, human resources, quality, security, and information, along with a systemic approach to all medical and administrative processes, can ensure the efficiency and effectiveness desired by patients and society in general [33,34].

Bradea I.'s works provide significant contributions, including the use of bibliometric techniques to assess the lev-

el of knowledge on hospital risk management published by researchers in databases like Web of Science and Thomson Reuters. Additionally, Bradea deepened the link between hospital efficiency and the seven Key Performance Indicators (KPIs) mandated by Romanian standards for evaluating management quality in these institutions [35,36].

Human resources are highlighted as the invaluable yet insufficient living source generating significant or critical risks within the system. Document archiving, crucial for managing procedural activities with potential impacts on patient care, is identified as a prevalent issue in Romanian medical services.

Conclusions

In this research, through the administration of a questionnaire to medical staff specializing in Pathology Departments, several confirmed issues they encounter were identified, and administrative risks were classified based on their severity. Notable differences in viewpoints between the two respondent groups are evident concerning specific risk categories, stemming from the unique nature of their tasks and their impact on service quality and efficiency. The findings validate that the Diagnostic Related Groups system has demonstrated shortcomings, portraying an inaccurate and misleading depiction of the tasks performed by pathology anatomy service employees.

Study Limitations

The study falls within clear parameters, focusing on applied research with human resources as its central focus. One limitation is the absence of specialized expertise in managerial risks within the field. Another constraint pertains to the narrow scope of the investigation, which was confined to a limited selection of hospitals and healthcare facilities situated in the Central region of Romania.

Authors' contribution

AMP: conception and design, acquisition of data, analysis and interpretation of data, drafting the article, final approval of the version to be published
BAL: revising the article, acquisition of data, analysis of data, final approval of the version to be published
LON: acquisition of data and interpretation of data, final approval of the version to be published
OSC: revising the article, acquisition of data, analysis of data, final approval of the version to be published
SV: drafting the article, interpretation of data, final approval of the version to be published
conception and design, acquisition of data

Conflict of interest

None to declare.

References

- Gopinathan U, Hoffman SJ. Institutionalising an evidence-informed approach to guideline development: progress and challenges at the World Health Organization. *BMJ Global Health*. 2018 Sep;3(5):

- e000716.
2. Anderson DM, Mahamane E, Bauza V, Mahamadou KOB, Tantum L, Salzberg A. Effects of environmental conditions on healthcare worker wellbeing and quality of care: A qualitative study in Niger. *PLOS Global Public Health*. 2023 Dec 20;3(12): e0002590.
 3. Radu CP, Pana BC, Pele DT, Costea RV. Evolution of Public Health Expenditure Financed by the Romanian Social Health Insurance Scheme From 1999 to 2019. *Frontiers in Public Health*. 2021 Dec 1;9.
 4. Huerta TR, Harle CA, Ford EW, Diana ML, Menachemi N. Measuring Patient Satisfaction's Relationship to Hospital Cost Efficiency. *Health Care Management Review*. 2016 Jan;41(1):56–63.
 5. Pink GH, Murray MA, McKillop I. Hospital efficiency and patient satisfaction. *Health Services Management Research*. 2003 Feb;16(1):24–38.
 6. Chernof B, Hilborne L, Heckman M, Esquivel M, Guterman JJ. The link between the Department of Pathology and Laboratory Medicine and medical administration. Managing the quality continuum. *American Journal of Clinical Pathology*. 1995 Apr 1;103(4 Suppl 1): S24-29.
 7. Benediktsson H, Whitelaw J, Roy I. Pathology Services in Developing Countries: A Challenge. *Archives of Pathology & Laboratory Medicine*. 2007 Nov 1;131(11):1636–9.
 8. Ducatman BS, Ducatman AM, Crawford JM, Laposata M, Sanfilippo F. The Value Proposition for Pathologists: A Population Health Approach. *Academic Pathology*. 2020 Jan 1; 7:237428951989885.
 9. Bhati D. Improving Patient Outcomes Through Effective Hospital Administration: A Comprehensive Review. *Cureus*. 2023;15(10).
 10. Akinleye DD, McNutt LA, Lazariu V, McLaughlin CC. Correlation between hospital finances and quality and safety of patient care. *Abe T, editor. PLoS One*. 2019;14(8).
 11. Kavalier F, Spiegel AD. Risk management in health care institutions: a strategic approach. Sudbury, Mass.: Jones and Bartlett Publishers; 2003.
 12. Park SJ, Sharp AL. Improving health and health care efficiency through risk management. *Journal of Hospital Management and Health Policy*. 2019 May; 3:9–9.
 13. Fernández-Castelló AI, Valle-Pérez P, Pagonessa-Damonte ML, Blazquez-Muñoz M, Tomás JF. An experience in integrated management of clinical risks. *Journal of Healthcare Quality Research*. 2018 Nov;33(6):311–8.
 14. Carroll R. Enterprise risk management: A framework for success. *American Society for Healthcare Risk Management*. 2014.
 15. Fusco A, Dicuonzo G, Dell'Atti V, Amoo N. The clinical risk management. A case study. *MANAGEMENT CONTROL*. 2017 Sep;(3):31–52.
 16. Park SJ, Sharp AL. Improving health and health care efficiency through risk management. *Journal of Hospital Management and Health Policy*. 2019 May; 3:9–9.
 17. Chiozza ML, Ponzetti C. FMEA: a model for reducing medical errors. *Clinica chimica acta*. 2009;404(1):75-78.
 18. Reason J. Human error: Models and management. *BMJ (Clinical Research ed)*. 2000 Mar 18;320(7237):768–70.
 19. Fisher M, Kiernan M. Student nurses' lived experience of patient safety and raising concerns. *Nurse education today*. 2019; 77:1-5.
 20. Brennan D, Timmins F. Changing institutional identities of the student nurse. *Nurse Education Today*. 2012 Oct;32(7):747–51.
 21. Li H, Zhao W, Li B, Li Y. Effects of the small private online course combined with simulation-based training in a patient safety education program among nursing students: A quasi-experimental study. *International Journal of Nursing Sciences*. 2023 Oct 1;10(4):555–61.
 22. Allison SE, McLaughlin-Renpenning KE. *Nursing administration in the 21st century: A self-care theory approach*. SAGE Publications. 1998.
 23. Witte K, Meyer G, Martell D. *Effective health risk messages: A step-by-step guide*. SAGE Publications, 2001.
 24. Liu HC. *Improved FMEA Methods for Proactive Healthcare Risk Analysis*. Singapore: Springer Singapore; 2019.
 25. Tulloch J, Lupton D. *Risk and everyday life*. SAGE Publications, 2003.
 26. Homauni A, Markazi-Moghaddam N, Mosadeghkah A, Noori M, Abbasiyan K. Budgeting in healthcare systems and organizations: A systematic review. *Iranian journal of public health*. 2023 Sep 9;52(9).
 27. Gao H, Chen H, Feng J, Qin X, Wang X, Liang S, et al. Balanced scorecard-based performance evaluation of Chinese county hospitals in underdeveloped areas. *Journal of International Medical Research*. 2018 Mar 22;46(5):1947–62.
 28. Antohi VM. Romanian Healthcare Financing Based on The Diagnosis - Related Group Payment System (Drg). *European Proceedings of Social and Behavioural Sciences*. 2017 Jul 30.
 29. Mihailovic N, Kocic S, Jakovljevic M. Review of Diagnosis-Related Group-Based Financing of Hospital Care. *Health Services Research and Managerial Epidemiology*. 2016 Apr 27;3.
 30. Essila JC. Strategies for reducing healthcare supply chain inventory costs. *Benchmarking: An International Journal*. 2023;30(8):2655-2669.
 31. Vlădescu C, Astărăstoae V, Scînte SG. A health system focused on citizen's needs. Romania. Situation analysis (I). *Romanian Journal of Bioethics*. 2010;8(2):87-96.
 32. Mihalas GI, Bazavan M, Farcas DD. Implementation of health information systems in Romania. *Methods of Information in Medicine*. 2006;45(1):121–4.
 33. Petre I, Barna F, Gurgus D, Tomescu LC, Apostol A, Petre I, et al. Analysis of the Healthcare System in Romania: A Brief Review. *Healthcare*. 2023 Jul 19;11(14):2069.
 34. Voinea L; Pamfilie R. Considerations regarding the performance improvement of the hospital healthcare services from Romania by the implementation of an integrated management system. *Amfiteatru Econ*. 2009; 9:339-345.
 35. Bradea IA. Risks in hospitals. Assessment and Management. *Romanian Economic Journal*. 2014;17(54):25-36.
 36. Lucian Mirescu, Ana-Maria Camelia Popescu, Iuliana Manuela Dragomir. Comparative Statistical Analysis of Key Performance Indicators in the Health System. *PubMed*. 2023 Oct 3;49(2):200–9.