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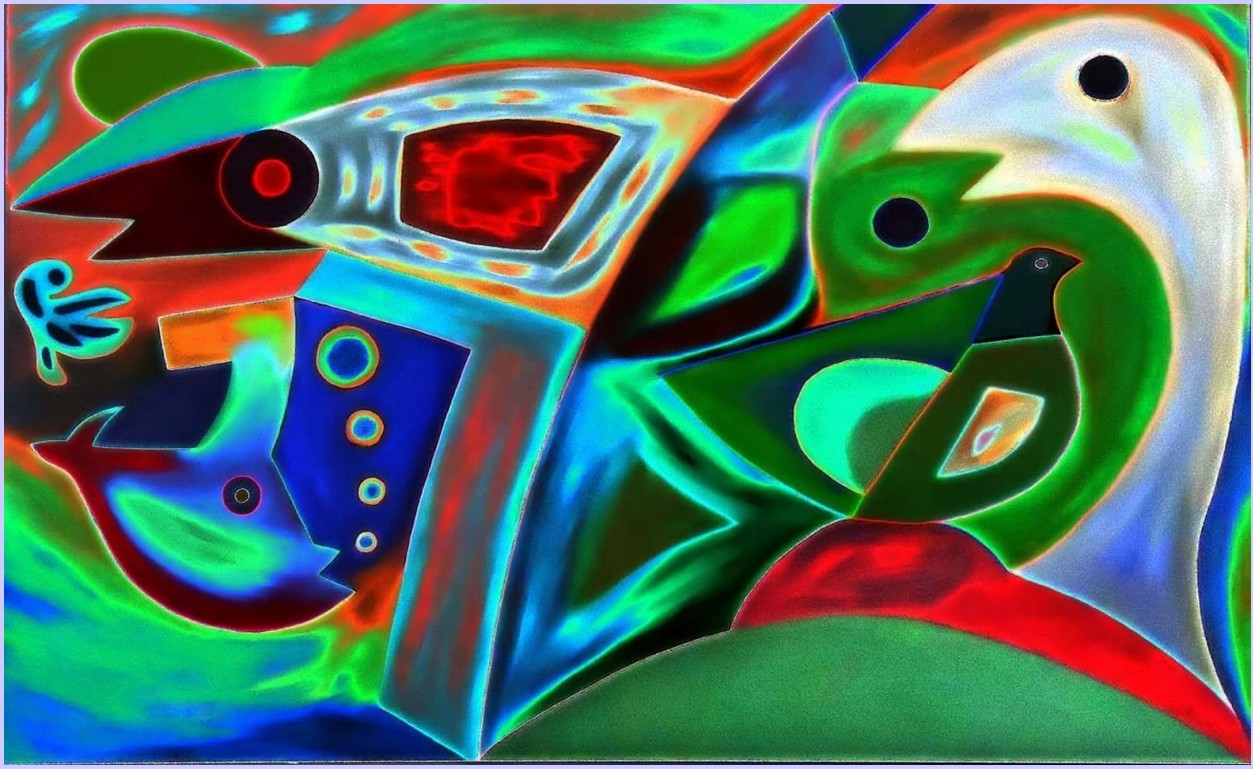

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Human Factor in Safe Health Care

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Abstract. Over the past half century, health care has seen incredible progress related to reducing the frequency and severity of harm to patient health and life in the delivery of health care. Nevertheless, the attention of health care scientists and practitioners has begun to increase. The sources of adverse events have come to the attention of health care scientists and practitioners, such as human factor, extra-organizational causes, self-destructive behavior of the patient, which today changes the distribution of sources of adverse events.
The foundation for building a strategic ladder of safe health care should have been based on the management of deviations related to illness, effective communication, patient education, and others.

Key words: health care, patient safety, safe technology, deviance management, human factor.

1. Introduction

Providing medical care, the physician, first and foremost, counts on the benefit to be derived from properly chosen and impeccably performed medical interventions. A patient who receives this care, on the other hand, expects all of their health expectations to be undoubtedly met. But medical care has a downside, which is the harm associated with providing it. Over the past half century, there has been incredible progress in health care in reducing the frequency and severity of the harms. Unfortunately, this progress has not been accompanied by an increase in public satisfaction with the safety of medical care [1]. On the contrary, in many countries there has been a surge of lawsuits, sanctions, and even criminal prosecutions against the medical professionals. And, therefore, any attempt to find a healthy and constructive compromise between capabilities of modern medicine, expectations of patients, views of society, and the requirements of the law that relates to the safety of medical care is of a particular scientific and practical interest.

2. Data and Methodology

This paper presents an analytical study concerning the subject of building safe health care. The scientific literature for the period 2000-2021 was collected using medical databases MEDLINE, Cochrane Collaboration; EMBASE, Scopus, and Web of Science. A review-analytical study of the main issues of building patient-safe healthcare. The strategy of building safe health care is presented as a strategic ladder.

3. Results and Discussion

The harm associated with health care is not a myth, but an inevitable companion to the process of health care provision. In providing medical care, one in five patients experiences a medical error, and one in ten hospitalized patients suffers mental or physical trauma due to the process of medical care itself, which causes one

in five inpatient deaths and one in ten deaths in the population of developed countries [2-6]. The most precise definition of an adverse event or additional harm is given in a report by the US Institute of Medicine, which refers to it as unintentional physical or psychological trauma inflicted on a patient, resulting in temporary or permanent disability, death, requiring monitoring, treatment, or hospitalization, more likely related to the provision of medical care than to the course of the underlying disease or comorbid conditions [7]. The definition described reflects only two kinds of harms: additional and possible, which are combined in one term - an adverse event. But there is also a third type associated with technologies – an anticipated or expected harm. Additional and possible harm refer to the consequences of risk events, while the magnitude of expected harm is, rather, a limitation to the use of medical technologies [8-14].

One hundred years ago medical technologies that were characterized by low clinical efficacy, significant trauma, and high risks of possible harm were the main contributors to the (un)safety of medical care. Nearby were the resources used in technology (Fig.1), and that is why the entire potential of scientific and practical medicine, first of all, was focused on the improvement of technologies and their resource provision. The main areas of improvement in technology were choosing the right technology, getting the technology right, and creating new technologies with better quality and the likelihood of a positive outcome. The next and partly parallel stage was the improvement of technology resourcing, where the main areas were building safe infrastructure, creating safe and securely resourced workplaces, adequate funding, and timely access to valid and relevant information. All of the above has led to a dramatic increase in positive clinical outcomes and a significant reduction in the severity of expected harm.

Fig. 1. Initial contribution of various sources to the health care safety.
Source: the authors' creation.

As a result, the safety of medical care has increased tenfold [13-16] (Fig. 2). However, in the area of satisfaction with the health care system, there is a completely opposite trend: even in developed countries, satisfaction today does not exceed 40%, and dissatisfaction with health care providers is increasing year by year [15,16]. In

the United States, the vast majority of physicians face litigation during their careers [17]. So, why does this paradox exist?

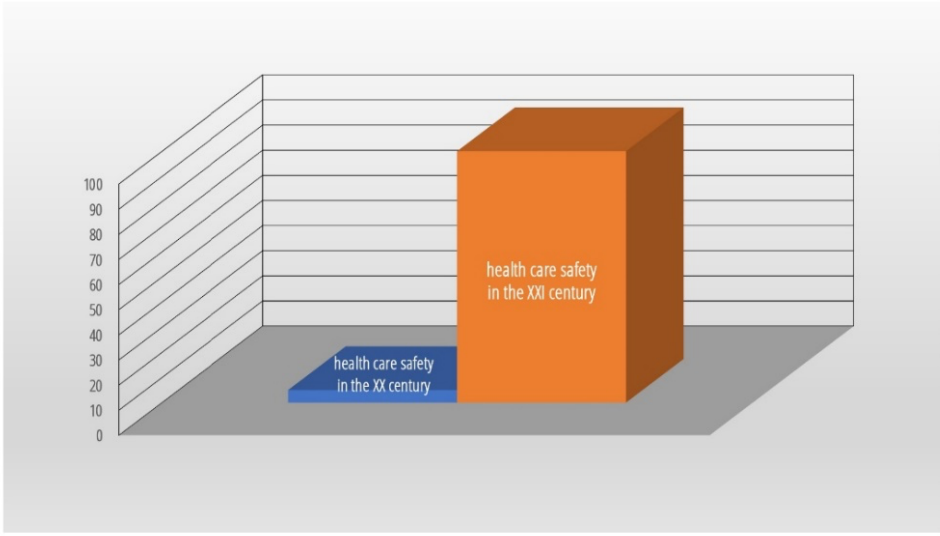

Fig. 2. The comparison of health care safety: XX and XXI centuries.
Source: the authors' elaboration.

The fact is that throughout the history of medicine, cases of expected and possible harm (related to medical technology) have been accepted by all of society as objective inevitability. And additional harm was, at least until the end of the twentieth century, the subject of discussion exclusively within the medical community. This was due to the fact that the cumulative value of expected and possible harm was so large that it completely absorbed the statistics of additional harm, the proportion of which was less than 1%. Today, against the background of a significant reduction in the proportion of expected and possible harm accepted by all, the share of additional harm in the structure of adverse outcomes of treatment has become almost 50%, and this cannot go unnoticed by all the participants of the process of health care provision (Fig. 3). As a rule, society associates additional harm with nonethical (deviant) behavior of medical workers, which is in contradiction with good intentions [12, 18, 19]. In addition to the human factor, sources of additional harm can be the organization and behavior of the patient himself. As a result of the fact that for a long time such sources of adverse events as human factors, organizational and extra-organizational causes, as well as patient behavior, have not been in the focus of scientists and practitioners in health care, we now have the following distribution of sources of adverse events (Fig. 4). The first place takes the human factor, the second one – the behavior of the patient, and the third – organizations and extra-organizational causes. Technology itself came last [5,8,13,20,21].

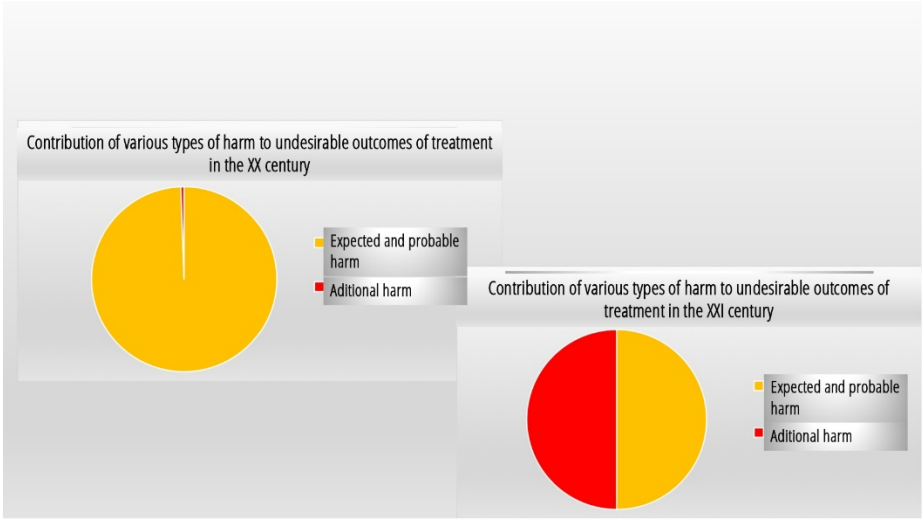

Fig. 3. The comparison of contribution of various types of harm to undesirable outcomes of treatment: XX and XXI centuries.
Source: Self-development by the authors.

Fig. 4. Sources of the root causes of adverse events.
Source: the authors' elaboration.

That's why the best medical organizations and the best healthcare systems, borrowing from aviation, made the poorly managed human factor the first priority, focusing the main directions on system redundancy in terms of building additional safeguards against human errors and resulting incidents, managing team

performance, and building a safe technological interface. A new safety culture, based on a systemic mental model of the origin of adverse events and an unapologetic climate in the organization, was at the core of human factor management. Later, attention began to be paid to making changes to the organizational environment in order to eliminate organizational vulnerabilities as fully as possible, leading to the failure of safety systems in the chain of transformation of threats related to the physical environment, the human factor, and patient behavior. Safe technologies, a safe physical environment, a manageable human factor, and an optimized organizational environment without vulnerabilities have created the conditions for managing patient behavior and engaging the patient in safety management. This direction was based on the management of deviations associated with the disease, effective communication, and patient education [12,13,14,20].

From the point of view of the system approach to safety management, the construction of high reliability medical organizations, where 100% of the identified risks of harm are managed on the basis of a constant expectation of failures and deviations, has special prospects. High reliability organizations place special emphasis on system redundancy in terms of permanent monitoring of atypical signals, development of algorithms to respond to threats and incidents, and regular rehearsal of algorithms [11].

It should be noted that the described transformations should be carried out in accordance with the logically obvious strategic ladder, where the first step is the improvement of medical technology, the second one is the production and provision of safe material resources, the third is a system redundancy in terms of human factor management, the fourth is an elimination of organizational and non-organizational vulnerabilities, and the fifth is the management of patient behavior. On the very last step will be the construction of organizations of high reliability. The changes listed should occur in parallel with the corresponding changes in macro-factors and the external micro-environment (Fig. 5).

Fig. 5. Strategic ladder in building safe health care.
Source: the authors' elaboration.

Violation of the described sequence will have an extremely negative impact on the overall strategic result because jumping through the steps will negate all the advantages of the previous step. For example, all the benefits of sound organizational

change can be completely swallowed up by an unmanageable human factor and a dilapidated infrastructure.

4. Conclusion

Study results show that a secure technology and physical environment, controlled human factors, and an optimized organizational environment without vulnerabilities create the conditions for patient behavior management and patient involvement in safety management. The foundation for building a strategic ladder of safe health care should have been based on the management of deviations related to illness, effective communication, patient education, and others.

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Aims and Objectives

Published online by Institute of Certified Specialists twice a year, **Journal of Digital Art & Humanities (JDAH)** is an international peer-reviewed journal which **aims** at the latest ideas, innovations, trends, experiences and concerns in the field of the digital arts & humanities. JDAH bridges humanitarian, artistic, and scientific disciplines, allowing author(s) to express the views on the subjects studied using modern digital/information technology. It is a nexus for information exchange among academia and industry addressing theory, criticism, and practice. The effective dissemination of original ideas/results generated by the human brain and presented/reflected in articles created using modern information/digital technology is **the main objective of JDAH**.

Topics to be discussed in this journal include the following: Digital Journey; Ethical Climate in the digital age; Human Factor in Healthcare in the digital age; Health Psychology in the digital age; Role of Human-Computer Interaction in Psychology; The Critical Thinking Initiative; Ecotourism in the digital age.

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