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DIGITALIZATION IN POLISH MEDICAL ENTITIES – RESPONSIBILITIES, BENEFITS AND BARRIERS – A CASE STUDY

Marta SIKORSKA

Department of Accounting, Faculty of Management, Univeristy of Gdańsk; marta.sikorska@ug.edu.pl, ORCID: 0000-0001-8598-4077

Purpose: The article aims to indicate medical entities' obligations in the field of digitalization as well as the associated benefits and barriers, based on a case study of a medical outpatient clinic.
Design/methodology/approach: A review of the literature on digitalization in medical entities was conducted. An analysis of legal acts was also carried out to determine the obligations of Polish medical entities in this regard. The research part draws on a survey interview with a pharmacist and a case study of a medical outpatient clinic.
Findings: The analysis of legal acts allowed specification of the continually increasing digitalization obligations faced by Polish medical entities. The medical entity surveyed complies with all obligations. It also assessed the benefits associated with the digitalization process highly and, as a unit demonstrating an advanced level thereof, does not identify any significant barriers to its implementation. The interview conducted with the pharmacist revealed that the obligation of e-prescribing is already widely fulfilled.
Research limitations/implications: The benefits and barriers were assessed by one medical entity owner, whereas the level of compliance with e-prescription obligations was determined by one pharmacist. This means that the results obtained cannot be generalized to the entire population of entities and all healthcare professionals. This study can be further expanded by including a larger number of entities and comparing the data with foreign entities.
Practical implications: By highlighting the benefits of digitalization by the surveyed entity, the article can mobilize other entities and encourage them to digitize.
Social implications: The article has the potential to raise patient awareness of expectations regarding medical practices.
Originality/value: The article raises the little-recognized but timely topic of digitalization in medical units and is addressed to both medical entities and their patients. Due to the scarcity of publications on digitalization and the scope thereof in medical entities, the paper partially bridges the research gap in this area. The survey also allowed to formulate future research plans, i.e., to extend the study to other medical entities in order to identify the reasons behind the slow pace of digitalization in Polish medical entities, explore for solutions to this challenge, and compare the data with other countries.

Keywords: digitalization, digital transformation, medical entities.

Category of the paper: Case study.

1. Introduction

Technological development is progressing, and it cannot continue without affecting the healthcare sector. The "Future Health Index 2019" report shows that 82% of Polish patients wish to have access to their medical history records on an ongoing basis. Meanwhile, amongst the 35 European countries assessed for the performance of healthcare systems, including e-health, Poland ranked a distant 32nd in 2019 (Szajczyk, 2019). There has been no significant improvement in data sharing and the use of e-services in subsequent years. A survey of the degree of informatization in healthcare providing entities, conducted in 2022, indicated that merely less than 17% of the surveyed units facilitate the use of e-services via a website, which is a result 12 p.p. worse than in the previous year. This highlights the fact that this area of digitalization requires particular improvement. Although it might seem that telemedicine has been set to become widespread after the pandemic, only 25.5% of medical facilities do offer such services. With only 26.1% of the surveyed entities digitally mapping the records kept in paper form, the degree of documentation digitization also needs to be addressed. The survey data also indicate, however, that 89% of the respondent healthcare entities employ Electronic Health Record (HER) systems, representing an increase of more than 20 percentage points compared to the previous year (VI Edycja Badania stopnia informatyzacji…, 2022). The survey cited above thus reveals that the level of digitalization has been increasing in some respects, but other issues still need improvement. These changes will not take place without showing the actors the benefits they can gain from digitalization and familiarizing them with the barriers they may encounter during the implementation.

The aim of the article, therefore, is to identify the digitalization obligations, the benefits thereof as well as the challenges faced by medical entities in this regard. The following research questions were posed during the study:

1. What digitalization obligations are medical entities confronted with?
2. What are the benefits of digitalization?
3. What barriers do entities encounter in implementing digitalization?

Part one of the article outlines the essence of digitalization and provides a review of the literature on digitalization in medical entities. Part two explores the course of the digitalization process in Poland - an analysis of legal acts was carried out to determine the obligations of entities in the field of digitalization. The third part features a description of the research methodology adopted, based on a case study of a medical outpatient clinic and a structured interview held with the unit. The results of the research are presented and discussed as well - the degree of the unit's digitalization and its compliance with the mandatory aspects thereof were verified, followed by a presentation of an assessment of the benefits of digitalization and the challenges associated with it. A semi-structured interview was also conducted with the pharmacy owner to gain insight into the extent of compliance with e-prescribing regulations. Finally, the research conducted has been summarized and research plans have been outlined.

The following research methods were used in the article: literature review, analysis of legal acts, case study and descriptive method.

2. Digitalization in medical entities

2.1. The essence of digitalization

Digitalization, according to the definition of the Dictionary of the Polish language [PL: Słownik Języka Polskiego], entails the dissemination and popularization of digital technology and the large-scale introduction of electronic infrastructure. The process of digitalization thus involves integration of advanced technology into all processes, products and services (Parida, 2018). It is aimed at improving the efficiency of enterprises through changes in their operations that based on information technology. The concept of digitalization is sometimes equated with the term digital transformation. Paavola, Hallikainen, Elbanna (2017) define it as the use of new digital technologies to streamline business processes, in order to improve customer service, inter alia. According to Zimnoch (2021), one of the stages of digitalization is digitization, which the Dictionary of the Polish Language defines as putting written and printed data, stored on magnetic or other carriers, into digital form. The process thus involves the transition to electronic records from the previously paper form of documentation. Similarly, A. Niewęgłowski defines this process as the transformation of a particular intellectual content record, which hitherto functioned in analog form, into digital form (Niewęgłowski, 2021).

2.2 Digitalization in medical entities - a literature review

To outline the essence and importance of digitalization in medical entities, a preliminary literature review was conducted during the period from January 5 to January 19, 2023. The review covered Scopus and EBSCO databases and, due to the dynamic development of technology, did not include articles written before 2013. Combinations of the following keywords were used:

a) digitalization, digitization, digital transformation
b) medical entities.

Out of 56 articles identified, 18 were singled out as noteworthy. The articles selected were divided into three research streams: data, medical records, security; healthcare facility management; and digitalization readiness and effects. In each group, common conclusions and main research areas can be found. An overview of these is presented in Table 1.

Table 1.
Literature review

Research stream	Autor/s
Data, medical records, security	
Medical records digitization, data protection and exchange, medical data management, decentralized model of access control.	Rana, S.K., Rana, S.K., Nisar, K., (...), Goyal, N., Chawla, P. (2022) Schönermark, M.P. (2019)
Healthcare cyber security, blockchain-based security framework, data control.	Lehto, M., Neittaanmäki, P., Pöyhönen, J., Hummelholm, A. (2022), Siva Rama Krishnan, S., Manoj, M.K., Gadekallu, T.R., (...), Suh, D.Y., Piran, M.J. (2020), Polap, D., Srivastava, G., Jolfaei, A., Parizi, R.M. (2020) Essefi, I., Boussi Rahmouni, H., Solomonides, T., Fethi Ladeb, M. (2022)
Use of Entity Resolution to maintain electronic medical records.	Gupta, T., Deshpande, V. (2020)
Healthcare facility management	
Perceived managerial competence in digital healthcare services.	Ylitalo, A., Laukka, E., Heponiemi, T., Kanste, O.I. (2023)
Digital-age changes in facility management and staffing.	Masár, D., Ondria, P. (2022)
Digitalization effects and implementation readiness	
Digitalization of medicine and healthcare is enabling process streamlining and measurement system optimization.	Kübler, W.F. (2017)
U-healthcare enables services to be delivered from anywhere at any time as well as responds to the advances in medical technology and increased demand for healthcare.	Kim, H.-K. (2014)
Telemedicine enables collaboration between remote medical units and automation of healthcare process management.	Brzezinski, J., Kosiedowski, M., Mazurek, C., (...), Stroinski, M., Weglarz, J. (2013) Milne, R., Costa, A. (2020)
Design and implementation of an international, intelligent hospital information system, with the aim of improving the application of the IT system in the process of diagnosis and treatment, to provide patients with high quality services.	Shen, L., Liu, H., Tian, W., Zhang, S. (2020)
Assessment of Polish primary healthcare units' organizational readiness for the e-health concept and the factors influencing the level of e-readiness for digital transformation.	Kruszyńska-Fischbach, A., Sysko-Romańczuk, S., Napiórkowski, T.M., Napiórkowska, A., Kozakiewicz, D. (2022) Kruszyńska-Fischbach, A., Sysko-Romańczuk, S., Rafalik, M., Walczak, R., Kludacz-Alessandri, M. (2022)
Application of digital twins in medicine and public health care.	Kamel Boulos, M.N., Zhang, P. (2021), Sharma, C., Gupta, G. (2021)

Source: own compilation based on Scopus and EBSCO databases.

The literature review allowed indentification of several areas under discussion. A total of 7 of the 18 selected publications covered the issues of medical records, data management, data protection and data security. These data include patient medical records, but also drug-related information, namely information obtained from medical devices and in clinical trials. In these publications, the importance of data control and protection has been stressed, and a security framework has been proposed. Two of the articles reviewed focused on the management of medical facilities. In these articles, the changes taking place as a result of digitalization, as well as the perception of managerial competence at different levels of management in digital healthcare services, have been highlighted. The effects of digitalization

have been discussed in 7 publications. These included process streamlining and measurement system optimization, improved service quality, provision of services from anywhere at any time, and remote collaboration between medical entities. Not every entity, however, shows the same degree of readiness for digitalization, as two publications by Polish specialists report. These authors emphasize that an entity's readiness depends on its operational capabilities, which are the sum of valuable and unique resources, the ability to use those resources, as well as technological capabilities conditioning the adoption and use of technological innovations.

The literature review revealed a scarcity of publications describing the obligations, benefits and barriers to digitalization in medical entities, uncovering an existing research gap in this area, which whis article aims to partially fill.

3. The state of digitalization in Polish medical entities - a review of legal regulations

Digitalization is present in every area of life. It cannot be absent from the healthcare sector either. Some aspects of medical entity digitalization, initially voluntary, become mandatory over time. The process of digitalization in Polish medical entities is ongoing and continually progressing. Before specifying the legal status of digitalization in the healthcare sector, it is worth defining what medical entities are and what the medical activities they provide consist of. According to the Act of April 15, 2011, on Medical Activity, medical entities encompass:

1. entrepreneurs, within the meaning of the provisions of the Act of March 6, 2018 - Entrepreneurs Act (Journal of Laws 2021, item 162 and 2105; Journal of Laws 2022, item 24), in all forms provides for the performance of business activities, unless otherwise provided by law,
2. independent public healthcare institutions,
3. budgetary units (…) with ambulatory care as well as ambulatory care with an infirmary or primary care physician, primary care nurse or primary care midwife in the organizational structure, within the meaning of the provisions of the Act of October 27, 2017, on Primary Healthcare (Journal of Laws 2021, item 1050),
4. research institutes referred to in Article 3 of the Act of April 30, 2010, on Research Institutes (Journal of Laws of 2020, item 1383; Journal of Laws of 2021, items 1192 and 2333),
5. foundations and associations, the statutory purpose of which is to perform healthcare tasks and the statute of which allows therapeutic activities,

   5a) incorporated organizational units of associations referred to in point 5,

6. legal persons and organizational units acting on the basis of regulations on the relationship of the State to the Catholic Church in the Republic of Poland, the relationship of the State to other churches and religious associations, and guarantees of freedom of conscience and religion,
7. military units,

   - within the scope in which medical activities are performed. (Article 4 (1) of the Act of April 15, 2011, on Medical Activity).

The function of medical activity is to provide healthcare services, also by means of ICT or communications systems. Health care services, in turn, entail activities aimed at preserving, saving, restoring or improving health, as well as other medical activities resulting from the process of treatment or separate regulations governing the rules of the performance thereof. (Article 2(1)(10) of the Act of April 15, 2011, on Medical Activity).

Types of medical activities include:

1. stationary and round-the-clock health care services - hospital and non-hospital,
2. outpatient health care services - basic or specialized health care services not required under inpatient and round-the-clock regime, including medical rehabilitation and diagnostic tests.

It is also worth noting that healthcare activity can be commenced after obtaining an entry in the register of health care entities, maintained via an information and communication system (Act of April 15, 2011, on Medical Activity).

Digitalization in medical entities is regulated by a number of laws. The Act of April 28, 2011, on the Healthcare Information System specifies the organization and operation of an information system, in which data essential for the state health policy, improvement of the quality and availability of healthcare services, and financing of healthcare tasks are processed. It includes databases created by the obligated entities, containing information on provided and planned services as well as the providers and recipients thereof.

The information system comprises databases functioning within:

1. the Medical Information System [PL: System Informacji Medycznej] (hereinafter: SIM),
2. field information and communication systems.

The Act of February 17, 2005, on Computerization of the Activities of Entities Performing Public Tasks, which also covers independent public health care institutions performing public tasks, stipulates that ICT systems meeting minimum requirements and ensuring interoperability of systems should be used for the implementation of those tasks. When processing data via an ICT system, entities are obliged to enable the transfer of data in electronic form, using IT data carriers or means of electronic communication (Act of February 17, 2005, on Computerization of Activities...).

The e-Health Center has developed a product - the e-Health system (P1) - forming the basis for the digitalization of medical services. It enables the collection, processing and sharing of data on medical events and extends to all medical entities. The project was implemented in two phases - Phase 1 in 2007-2015 - the design phase and production of subsystems, and Phase 2 - in 2016-2022 - the production of the remaining products and integration thereof with the products of Phase 1, followed by implementation (e-Health System (P1), 2022).

As a result of Phase 2, the following functionalities have been launched (e-Health System (P1), 2022):

- e-prescription,
- e-referral,
- medical events,
- exchange of electronic medical records,
- Internet Patient Account [PL: Internetowe Konto Pacjenta (IKP), and Service Providers and Pharmacies Application [PL: Aplikacja Usługodawców i Aptek (AUiA),
- Publication Platform,
- Data Warehouse,
- E-Registration System,
- Teleconsultation System,
- online prescription ordering.

The legislation regulating the digitalization capabilities and obligations of medical entities has been successively coming into force since 2015. The mandatory aspects contained in the law are presented in Table 2. The mandatory aspects are presented in Table 2. Under the Act of October 9, 2015, amending the Law on the Healthcare Information System and certain other laws, as of December 12, 2015, the legislator has allowed the provision of health care services in the form of telemedicine. Relevant regulations have also been introduced, inter alia, in the Law on Medical Activity and in laws regulating individual medical professions. As of January 1, 2016, sick leave attestation in the form of an electronic document can be issued in parallel with the paper form. (Zoń, 2022). As of December 1, 2018, they are issued exclusively in this form (Act of May 10, 2018, amending the Law on Amendments to the Law on Social Security Cash Benefits...).

On January 1, 2019, pursuant to Article 13a of the Act of April 28, 2011, on the Healthcare Information System as well as the Regulation of the Minister of Health of May 8, 2018, on types of electronic medical records, an obligation to maintain electronic records with information on, inter alia, disease diagnosis, test results, healthcare services provided was introduced. The extension of this obligation to keep records of diagnostic test impressions came into effect on April 25, 2020, followed by inclusion of laboratory test result records, introduced on April 25, 2021 (Regulation of the Minister of Health of October 15, 2019, amending the Regulation on types of electronic medical...).

On January 8, 2020, based on Article 56 of the Act of April 28, 2011, on the Healthcare Information System, an obligation to issue e-prescriptions, in electronic form, was introduced. By virtue of the Act of July 19, 2019, amending certain laws in connection with the implementation of e-health solutions, e-referrals became mandatory as of January 8, 2021. This obligation applies to the issuance of electronic referrals for services specified in a list established by Regulation of the Minister of Health, including, inter alia, outpatient specialized services financed by public funds (Regulation of the Minister of Health of April 15, 2019...).

Table 2.
Digitalization obligations - legal regulations

Effective date	Legal Act	Introduced obligation
1 December 2018	Act of May 10, 2018, amending the Act on Amendments to the Act on Social Security Cash Benefits in Case of Sickness and Maternity and Certain Other Laws	e-sick leave
1 January 2019	Act of April 28, 2011, on the Healthcare Information System	maintenance of electronic records on, inter alia, disease diagnosis, test results, healthcare services provided
25 April 2020	Regulation of the Minister of Health of October 15, 2019, amending the Regulation on types of electronic medical records	maintenance of electronic records of diagnostic test impressions
25 April 2021		maintenance of electronic records of laboratory test results
8 January 2020	Act of April 28, 2011, on the Healthcare Information System	e-prescriptions
8 January 2021	Act of July 19, 2019, on amending certain laws in connection with the implementation of e-health solutions	e-referrals
1 July 2021	Act of April 28, 2011, on the Healthcare Information System	reporting of medical events via SIM
10 January 2022	Act of April 28, 2011, on the Healthcare Information System	National Health Fund (NFZ) settlements with health care providers based on medical events data

Source: own compilation based on laws and regulations.

As an additional requirement, as of July 1, 2021, every medical entity is mandated to report medical events via the Medical Information System (Article 56(2a) of the Act of April 28, 2011...). The catalog of events subject to reporting has been further expanded on of October 1, 2022 (Regulation of the Minister of Health of June 3, 2022...). Furthermore, as of January 10, 2022, the National Health Fund [PL: Narodowy Fundusz Zdrowia (NFZ)] has been required to settle accounts with healthcare providers on the basis of data on medical events (Article 56(2b) of the Act of April 28, 2011...).

A survey conducted by the e-Health Center in 2021 showed that the digitalization of the healthcare sector did not present high levels of implementation, which means not all entities were complying with the obligations imposed. Only 57.7% of the medical entities surveyed guaranteed access to a computer network in all rooms where medical records are processed, and only in 68% of entities every medical staff member had access to a computer. Medical personnel in 10% of the outpatient units surveyed did not have access to a computer at all (W placówkach medycznych nadal rządzi papier [ENG: Paper still reigns in medical

facilities], 2021). The slow development of digitalization in healthcare was indicated by the fact that in 2021, despite the mandatory reporting of medical events, only 15% of entities reported such events at least once (Obowiązkowa EDM to fikcja… [Mandatory EDM is a sham...], 2022). A survey conducted in the same year found that IT tools for electronic record keeping were available to 67% of specialty clinics and 65% of family clinics. Record-sharing services for other entities, however, were absent in as many as 88% of the entities (Cyfryzacja szpitalom idzie jak po grudzie [ENG: Digitalization of Hospitals is an Uphill Battle, 2021).

In 2022, as part of the VI Edition of the Survey of the Degree of Cimputerization in Entities Performing Medical Activities [PL: VI Edycja Badania Stopnia Informatyzacji Podmiotów Wykonujących Działalność Leczniczą], a similar survey was conducted on a group of 11 580 entities (10 195 represented outpatient healthcare services, hereafter: OHS). The data show a 20 percentage point increase in the number of healthcare entities equipped with systems supporting Electronic Medical Recordkeeping (hereafter: EMR), compared to the previous year. For 84% of the surveyed entities, the number of available computer workstations was found to be sufficient to the implement EMR. It is noteworthy, however, that when asked whether an IT solution for electronic medical record keeping and electronic medical data processing was in place, 89.0% of the respondents confirmed implementation of such solutions, but 34.2% admitted to only partial availability thereof. Merely less than half of the surveyed entities declared maintenance of EMR of information for physicians referring patients for further treatment, 28.4% of the surveyed facilities maintain EMR of laboratory test results with diagnostic imrpressions, and 33.2% of the surveyed units maintain EMR of non-laboratory diagnostic test impressions. Only 57.5% of the respondent units have implemented EMR indexing within the e-Health System (P1) and adopted reporting to the medical events system (VI Edycja Badania Stopnia Informatyzacji..., 2022). The studies cited clearly indicate that not all entities are fulfilling their obligations, which in turn means that a portion of medical entities are not ready for the digitalization process. This is further underscored by the fact that, despite the mandatory billing of the National Health Fund to providers based on medical event data, out of more than 180 000 entities, only 23 000 reported data, and even fewer exchanged e-documentation, hence the fulfillment deadline has been postponed to January 2023 (Porażka e-dokumentacji medycznej [ENG: The failure of medical e-documentation], 2022).

Despite the failures encountered, the e-Health Center does not intend to abandon the changes it has begun to make - it also has plans to introduce e-registration at outpatient specialist clinics, as well as standardize and introduce additional digital documents into the e-Health system, including electronic birth charts. School medicine records would also be included in the e-health system. "The National Transformation Plan 2022-2026 [PL: Krajowy plan transformacji na lata 2022-2026]" also envisages development of telemedicine, especially in diabetology, geriatrics, cardiology, obstetrics, psychiatry, palliative care and chronic diseases. The e-Blood system, in turn, is to serve as a management system for the blood collection and distribution process. A system for organ transplantation process management is also planned

(Cyfryzacja ochrony zdrowia w roku 2022 – co nas czeka? [ENG: Digitalization of Health Care in 2022 - what awaits us?, 2022). Additionally, implementation of an electronic patient card - a document containing up-to-date data on every Polish citizen and made available to medical professionals via the system - is planned. In the context of the future of digitalization in Poland, it is also worth highlighting the potential of Artificial Intelligence - it can be used to identify diseases based on X-rays using algorithms (Kister, 2021).

A change in the approach to the digitalization process could positively affect the level of implementation in Polish medical entities and provide an opportunity for further development - instead of treating it as an unpleasant obligation, the benefits thereof should be recognized. Digitalization in medical entities can bring a whole range of such benefits, both for patients as well as for the facilities.

Benefits on the patient side include (Czerska, 2020):

- improvement in the quality of services,
- higher patient data security,
- better access to healthcare and medical data,
- no requirement to accumulate medical records,
- shorter wait time for medical services, hospital admissions,
- availability of online medical consultation, videoconferencing with a doctor.

Benefits on the medical facility side include (Czerska, 2020):

- improvement in data security and data transfer speed,
- higher quality of services,
- elimination of bureaucracy,
- savings in resources as a result of eliminating redundant medical examinations/testing,
- reduction of administrative costs,
- reduction in treatment costs,
- unit management streamlining,
- reduction of medical errors,
- shorter patient visits and hospital stays,
- improvement of entity's image.

The recognition and taming of the possible barriers could also help increase the level of digitalization in medical entities. The digitalization implementation challenges identified entail provision of data security and transparency, as well as integration of various systems with the latest technologies (Czerska, 2020). As J. Chluska points out, substantial barriers to the modernization of information systems also include frequent changes the regulations governing the operation of medical entities, and the constant restructuring and transformation of entities (Chluska, 2015).

4. Methods

To achieve the research objective and obtain answers to the research questions posed, the case study method was employed. It allows for an assessment of the benefits and barriers associated with the digitalization in medical entities, as well as enable an understanding of the perception of digitalization by these entities. The single case study analysis has also served to outline the direction of empirical research to be undertaken in the future and delineate the selection of entities for further in-depth studies (Czakon, 2015).

A structured interview was conducted with the owner of an outpatient clinic, in which part of the questions stemmed from the review of literature and legal acts on digitalization in medical entities. The surveyed questions were divided into three parts. The first covered information specific to the entity, including information on medical event reporting, medical records and the security thereof. The second part covered e-services. Both parts were intended to indicate the stage of the unit's digitalization process and its compliance with the obligations in this regard. The third part involved the unit's assessment of the stage of its digitalization, specification of its level of satisfaction with the process, as well as identification of the benefits of digitalization and the barriers to its implementation. A 0-5 scale was used to assess the benefits, where 0 represents no identified benefit in a given area, and 5 - a substantial benefit to the facility. The barriers to be faced in the process of digitalization were assessed on a scale of 0-5, where 0 - no barriers, and 5 - a substantial barrier difficult to overcome. The survey was conducted on February 15, 2023.

Additionally, a semi-structured interview was conducted with a selected pharmacy owner on February 06, 2023. The questions concerned the current level of fulfillment of entities' e-prescribing obligations. Deviations from the fulfillment of those obligations were also identified.

5. Results

5.1. A case study of an outpatient clinic

The structured interview with the medical entity was conducted on February 15, 2023, in an effort to assess the stage of the entity's digitalization, as well as determine what benefits and challenges of digitalization it identifies, including the asseessment thereof. The entity surveyed is a Non-Public Health Care Institution [PL: Niepubliczny Zakład Opieki Zdrowotnej] (hereinafter: NZOZ), operating as a limited liability company. It provides an average of 8000 services per month.

Part One involved questions regarding whether medical event reporting had been implemented and whether billing with the National Health Fund is carried out based on medical event data, both of which were answered in the affirmative. This issue is of importance, as only 56% of OHS units implemented reporting, while billing with the National Health Fund based on medical data was enabled by only 13% of all obligated entities in 2022, according to survey conducted in 2022 as part of the VI Edition of the Survey of the Degree of Cimputerization in Entities Performing Medical Activities. An inquiry was also made regarding whether paper documentation is still in place, with a negative answer. This implies a complete transition to electronic documentation. The entity holds a sufficient number of computer workstations to implement e-documentation and exchanges electronic medical records with other entities. The entity surveyed also considers the electronic medical records to be secure.

The second part involved questions regarding the e-services. The entity issues e-referrals and e-prescriptions, thus fulfilling its digitalization obligations. It cites paper referrals to health resorts as well as Social Insurance Institution [Zakład Ubezpieczeń Społecznych (ZUS)], Agricultural Social Insurance Fund [PL: Kasa Rolniczego Ubezpieczenia Społecznego (KRUS)] and District Family Assistance Center [Powiatowe Centrum Pomocy Rodzinie (PCPR)] ertificates as deviations from electronic form of documentation. The entity surveyed also provides an e-registration system and online prescription ordering as well as electronic sick leave attestation. Teleconsulting services are available, although patients rarely use them. E-services can also be accessed via the entity's website for online medical results and registration. Both the results of the first and second parts indicated that the entity not only meets its digitalization obligations, but also uses voluntary solutions, thus demonstrating a high level of digitalization.

This was confirmed by the entity's response to the question in part three regarding its own assessment of the degree of digitalization at the facility - on a scale of 1 (very low level of digitalization) to 5 (very high level of technological sophistication), the entity set its level at 4. Moreover, the unit surveyed stressed that while it was satisfied with the degree of digitalization at the facility, it planned to further develop the process over the next 12 months.

The subject was also asked to assess the pace of mandatory digitalization in Poland. It was assessed as too slow. It is also worth noting that the entity additionally voluntarily performs analyses of its revenues and costs, as well as calculates and analyzes costs per patient. The entity also keeps an internal IT team to help introduce the digitalization process.

In part three, the entity was also asked to rate the benefits of digitalization on a scale of 0-5, where 0 represents no identified benefit in a given area, and 5 represents a substantial benefit to the facility. In the identification of benefits, the survey drew on the publication of I. Czerska (2020). The results are presented in Table 3.

Table 3.
Digitalization benefits

Benefit	0	1	2	3	4	5
improvemed patient service						x
faster access to patients' medical records sourced from another entity					x	
relieving medical staff from bureaucracy					x	
enhanced data security						x
increased service quality						x
reduced treatment costs		x				
reduced administrative costs			x			
unit management streamlining					x	
reduction of patient visits					x	
improved image						x
increased competitiveness						x
reduced number of medical errors						x
Personnel's increased job satisfaction				x		

Source: own elaboration.

The entity identifies the greatest benefits the areas of improved patient services, enhanced data security and increased quality of services, improved entity image, increased competitiveness, and reduced medical errors. Faster access to other entityies' medical records, relief of bureaucracy for medical staff, management streamlining, and reduced patient visits were also rated highly. Increase in personnel job satisfaction was set at a medium level. The benefit assessed the lowest was reduction in medical costs - digitalization has a marginal impact on reducing these costs. Slightly greater, though still insignificant, is the effect of digitalization on administrative costs.

The entity surveyed was also asked to rate the barriers to the implementation of digitalization on a scale of 0-5, where 0 represented no barriers and 5 represented a substantial barrier difficult to overcome. The results are shown in Table 4.

Table 4.
Barriers to implementation of digitalization

Barriers	0	1	2	3	4	5
lack of clear standards				x		
reluctance on the part of employees			x			
lack of financial resources			x			
insufficient number of computer workstations	x					
insufficient knowledge on the part of employees	x					
organizational problems	x					
overload of responsibilities	x					
issues of electronic data protection and cyber security	x					

Source: own elaboration.

As an entity that is highly advanced in terms of digitalization, it does not identify substantial barriers to the implementation. The biggest such barrier, though rated only at 3, is the lack of clear standards. For its part, the entity does not identify barriers at all in terms of insufficient number of computer workstations, insufficient employee knowledge, organizational problems, overload of responsibilities or cyber security. The subject also stressed that the systems offered

as part of the digitalization of medical entities tend to malfunction and the level of assistance offered s is not sufficient.

5.2. Survey with the farmacy owner - pharmacist

Seeking to obtain answers to questions regarding paper prescriptions and the use thereof against the introduction of mandatory e-prescribing, an interview was conducted with a selected pharmacy owner, a pharmacist. It turned out that despite the mandatory e-prescribing, paper prescriptions are still issued, though in very sporadic cases. In the period from January 02, 2023 to February 02, 2023, paper prescriptions accounted for 1.8% of all full-pay prescriptions, most of which were veterinary prescriptions, which are always issued in paper form. The full-pay prescriptions provided were mainly issued to patients by specialists: dentists, ophthalmologists, gynecologists or dermatologists. According to the pharmacist, this is partly due to the fact that a large number of the medications these specialists prescribe are not refundable, though this should not be taken as a rule. Indeed, occasionally prescriptions for refundable drugs are issued in paper form, but this accounts for less than 1% of all refundable prescriptions. Most commonly, these are "pro auctore" and "pro familiae" prescriptions (issued by doctors for themselves or their families). K. Zon (2022) confirms that paper prescriptions are feasible in such situations. The remaining paper prescriptions were issued in such form because of failures in the electronic prescribing system.

6. Methodology and scope of planned empirical studies

The literature review conducted, as well as the analysis of legal acts and the case study of an outpatient clinic, indicated a great potential for research in the field of digitalization in medical entities. The study will be conducted in three stages divided into a total of 9 phases, as outlined in Table 5.

Table 5.
Research plans

Research phase	Task	Research sample	Method
STAGE 1 – Preliminary study			
1) Literature review – preliminary (Scopus, EBSCO)	Digitalization in medical entities	-	Literature analysis
2) Legal regulations	Obligation of digitalization in medical entities	-	Analysis of Polish legal acts
3) Preliminary study	Presentation of digitalization benefits and barriers	Case study	Structured interview

Cont. table 5.

STAGE 2 – Main study			
4) Questionnaire 1	Reasons behind the slow digitalization in medical entities and remedies to improve the situation	Managerial personnel	Structured interview
5) Questionnaire 2		Medical entity employees	Questionnaire - MsForms
6) Result analysis	Research findings and conclusions drawn	-	Synthesis, deduction
STAGE 3 – Main study			
7) Literature review (Scopus, Web of Science)	Comparison of studies on digitalization in Polish medical entities with data from other countries	Medical entities - Polish and foreign	Literature analysis
8) Legal regulations	Digitalization obligation in Polish and foreign medical entities		Analysis of Polish and foreign legal acts
9) Result analysis	Summary of findings and conclusions drawn	-	Synthesis, deduction

Source: own elaboration.

This article entails implementation of the first stage of the planned research. The preliminary review of legal regulations indicated numerous digitalization obligations to be met in medical entities. As the results of the survey of the degree of medical entity computerization show, not all entities are fulfilling their obligations (VI Edycja Badania stopnia informatyzacji…, 2022). The entity surveyed as part of the case study, in turn, identified the pace of digitalization in medical entities as too slow in its view. This has given rise to stage two, in which the reasons for the slow development of digitalization in medical entities in Poland and approaches to solving this problem will be sought. This stage will be carried out based on the results of an empirical study conducted among a larger number of medical entities. Two research methods will be used: structured interviews with executives and a survey of medical professionals conducted using MsForms. The third stage, in turn, will involve a comparison of studies on digitalization in Polish and foreign medical entities. For this purpose, in-depth literature and regulatory reviews will be conducted.

7. Conclusion

Digitalization is continuously shaping the healthcare sector (Ylitalo et al., 2023), and the process of digital transformation is an urgent priority for the sector (Binci, Palozzi, Scafarto, 2022). Doctors are adapting to new technologies in different ways, and the best of them will set the pace of change and the effectiveness of the initiatives undertaken (Morland, Pettersen, 2017).

According to K. Kolas (2022), digitalization is the future, not least because, as the WHO warns, a shortage of personnel - even several million people - will emerge by 2035, and the digitalization process is expected to be one of the remedies for this crisis (Dane medyczne to złoto… [ENG: Medical data is gold...], 2022). Digitalization, therefore, is not only expected to support administrative operations and process control, but can also, through the use of remote monitoring, inter alia, improve the delivery of healthcare services, in terms of medical treatment alone (Binci, Palozzi, Scafarto, 2022). The pandemic also showed that e-health is indispensable and served as a reminder that digitization in health care enables continuity of services and coordination of healthcare services (P1 czarno na białym, 2022).

The literature review conducted has revealed a research gap in the area of digitalization in medical entities. There is a scarcity of detailed studies describing the responsibilities, benefits and barriers to the implementation of digitalization. The indicated research gap has been partially filled within the framework of this article.

The main purpose of the article was to identify the digitalization obligations of medical entities, as well as the benefits and barriers associated with it, based on a case study of an outpatient clinic. The study provided answers to the research questions posed. The review of legal regulations enabled outlining the obligations of Polish medical entities in terms of digitalization. The case study carried out as part of the study indicated that the entity surveyed is fulfilling its digitalization obligations. Nevertheless, it believes that the pace of implementation in Poland is too slow, and thus strives to develop in this area, with the help of an internal team of IT specialists. The entity rated the benefits of digitalization very highly. The highest rated benefits include improved patient service, enhanced data security and higher quality of services, improved image of the entity, increased competitiveness, and reduced medical errors. As a highly digitized entity, in turn, it rated the barriers to the digitalization process implementation quite low. The ‘lack of clear standards’ barrier received the highest score, although it was still rated as moderately hindering to the digitalization implementation process.

The survey interview with the pharmacist, by contrast, indicated that e-prescribing duties are being fulfilled in the vast majority of cases – the mandatory introduction of e-prescribing, however, has been in place for three years, which was sufficient time for its implementation.

The conclusions drawn from the literature review, the analysis of legal acts and the case study provide a rationale for undertaking further in-depth empirical research on digitalization in medical entities, taking the study carried out as a pilot study. Accordingly, the stages of the research to be conducted have been presented.

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