YEARBOOK OF UNWE (2025), ACADEMIC PUBLISHING HOUSE UNWE
ISSN (print): 1312-5486; ISSN (online): 2534-8949; http://unwe-yearbook.org/en/
DOI: https://doi.org/10.37075/YB.2025.1.0

A STUDY OF ELECTRONIC PRESCRIPTIONS IN BULGARIAN HEALTHCARE – IMPLEMENTATION, CONSEQUENCES, OPPORTUNITIES FOR THE STATE ADMINISTRATION AND THREATS TO SECURITY (2002 – 2024)

Georgi Filipov[1]
e-mail: georgi.filipov@unwe.bg

Abstract

This study reviews the implementation of electronic prescription systems (e-prescriptions) as an element of the national digitalization of Bulgarian healthcare between 2002 and 2024. The key developments in this process are examined, with a special focus on their effect on the healthcare system, the administration, and national security. Several advantages of introducing e-prescriptions were noted, such as simplifying bureaucratic processes, reducing counterfeit prescriptions, and providing better control over critical medicines for the healthcare system, such as antibiotics and diabetes drugs. At the same time, the study also found challenges in implementing e-prescriptions, including disagreements between doctors and pharmacists, technical problems, and difficulties with the use of digitized systems in remote areas without Internet coverage. No major breaches of information security or cybersecurity were observed during the study period. The study applies several research methods, including a literature review, documentary analysis, and comparative analysis with several European countries. It concludes that the introduction of e-prescriptions is a positive development from the point of view of the state administration and that its implementation is desirable if the necessary measures are taken to ensure information security, actual (not just formal) consensus is achieved, and access to critical medicines is ensured. Recommendations are made.

Keywords: digital prescriptions, e-prescriptions, digitalization, medical prescriptions, e-healthcare, medicine, Bulgaria

JEL: H51, I18, F52

Introduction

Background

The introduction of electronic prescriptions in Bulgaria's healthcare system is already a long-standing priority of several governments as part of a common national strategy for digitalization and implementation of e-government systems.

[1] PhD Candidate, Department for National and Regional Security, University of National and World Economy, Bulgaria, ORCID: 0009-0007-0547-8213

Such priorities are set out in a series of policies adopted at the national level, including the "National Strategy for e-Health and Digitalization of the Health System – 2030" (Council of Ministers of the Republic of Bulgaria, n.d.), "Roadmap for the implementation of the Strategy for the Development of e-Government in the Republic of Bulgaria for the period 2016 – 2020" (Council of Ministers of the Republic of Bulgaria, 2016) and others.

The existence of such policies from the second decade of the 21st century, continuing to this day, and with plans for their future development give a clear indicator that the transition to electronic prescriptions for prescribing medicines is a long-term intention of the Bulgarian state, which finds consensus among the various political forces and successive governments. Nevertheless, the implementation of such a system has been delayed numerous times and the various methods by which it can be integrated have become subject to, at times, bitter debates. The challenges faced in implementing such a system in a relatively poor country, such as Bulgaria, are multifaceted. The chronic underfunding of the healthcare system has left several deficiencies in many areas, despite some progress being shown after various reforms implemented in recent times (Ankov and Vasileva, 2025). The lack of comprehensive training on the use of more modern electronic systems by healthcare practitioners, combined with general social conservatism and institutional resistance to change must be addressed in order for such modernizing reforms to take root.

Purpose

The purpose of this study is to determine and describe the process of the introduction of electronic prescriptions in Bulgaria, to research the effect of said introduction, as well as to identify and describe the opportunities for improving the efficiency of the state administration in healthcare and managing any possible security risks posed by the matter at hand.

Thesis

The study's thesis is reflected in the following points – first, that the process of implementing e-prescriptions in the Bulgarian healthcare system has been unnecessarily delayed due to both socioeconomic factors and a lack of consensus among involved parties. Second, the global COVID-19 pandemic provided the impetus to finally implement such a system on a national scale. Third, the implementation of the system faced considerable challenges, both technical and social. Fourth, despite the aforementioned issues, the implementation of e-prescriptions has had a positive effect on several key indicators, such as the availability of certain critical medicines. Fifth, the challenges and risks arising from the system can

be successfully managed to an acceptable degree. Finally, the implementation of the e-prescriptions system has been a net positive development for Bulgarian healthcare and should continue.

Methodology

Within the study, the following research methods were used:

- Literature review – past studies and other scientific literature relevant to the topic were reviewed and analyzed.
- Document analysis – white papers, laws and regulations, publicly available reports, official stenographic records, news articles from reputable agencies, and other public materials concerning the subject were studied.
- Comparative analysis – quantitative and qualitative indicators were compared before and after the introduction of the systems described in the study, along with indicators from third parties that have implemented similar systems.

Scope

Due to the factual nature of the study of an ongoing event, some primary sources, including news articles and government declarations, which were not originally intended for scientific use, were nevertheless cited. Apart from the comparative analysis, the study covers the introduction of an e-prescription system only in the territory of Bulgaria. Alternative methods for writing prescriptions other than those applied in the country are outside the scope of this study.

The study covers the period from 1 January 2002 to 1 January 2024. While only events that take place within this timeframe will be placed under analysis, the sources and literature used for this study are not restricted to this publication period and can include subsequent works providing relevant context or information.

Any cited statements by any individuals or organizations that may be used in any way against other third parties or their reputations are quoted or paraphrased for context only and cited only as described in sources that were already publicly available at the time of the study's creation. The author does not make, support or dispute any claims as to the validity, truthfulness or veracity of such statements, nor makes any judgement for or against them. Such statements do not represent the author's own positions.

Prescription and insurance overview

Bulgarian law permits several discrete types of prescriptions. Most typical prescriptions, including both ordinary prescription medicines and over-the-counter medication that a medical practitioner may prescribe, are described in

most Bulgarian sources as “white” prescriptions. The name comes from Art 6 of the Bulgarian prescriptions ordinance, which states that the paper prescriptions should be written on a form with a white background (Naredba № 4 ot 4 mart 2009 g).

The same regulation allows for ‘special’ prescriptions, which permit the dispensation of certain drugs that would typically be prohibited, typically due to falling into the Bulgarian government’s list of restricted narcotic substances. Such ‘special’ prescriptions are issued under a stricter regime and use forms in different colors – yellow and green. For this reason, such prescriptions are commonly referred to as “yellow” and “green” prescriptions, respectively. These color-based names are typically carried over even when e-prescriptions are discussed, which do not involve the usage or issuance of the paper forms from which they are derived.

Separately, it should be noted that prescriptions which the NZOK (defined below) pays for involve a special regime, where the prescribing practitioner must enter medicine and condition codes. This does not require distinct forms but leads to the peculiarity that NZOK-funded medicines may sometimes be affected differently than other medicines by legislation or system integration changes. This will become relevant later in the study. Likewise, it should be noted that the amount paid by NZOK for medicinal products is exceeded by factors of two and four when compared to outpatient services and hospital treatment (Mitkova et al., 2022). For this reason, it is necessary to include “white” prescriptions in any analysis that aims to determine the economic efficacy and viability of e-prescriptions, as opposed to focusing entirely on NZOK-funded medicines, as examining only the latter would not give an entirely complete indicator when examining the economic performance of the measures.

The NZOK (National Health Insurance Fund; NHIF) is the Bulgarian state organ tasked with allocating funds to the public healthcare system. Health insurance is mandatory by law for all citizens and long-term residents, with employed adults insured through their employer. The Bulgarian state itself generally insures children, most university students, pensioners, and members of special groups (such as those receiving temporary unemployment benefits, military veterans, caregivers of persons with a high level of disability, those placed in social care institutions and prisoners). Self-employed and unemployed adults are required to insure themselves, if not already insured on another basis. Despite this, some people remain uninsured, as the state seemingly does not have the means or intent to actively enforce universal mandatory insurance. Even among the insured, prescription co-pays and other out-of-pocket expenses can frequently drive up patients’ costs (Ankov and Vasileva, 2025). The rates for the mandatory health insurance for unemployed adults are nevertheless relatively low – around 31

BGN (15.8 €) per month as of August 2023 (Natsionalna agentsiya za prihodite, 2023), though this amount is periodically increased. The discrepancies between the NZOK-funded and other prescriptions should be noted while comparing the fulfillment rates of prescriptions.

Introduction of e-prescriptions in Bulgaria

The topic of e-prescriptions in Bulgaria has been discussed since 2002. However, for years after its beginning, no concrete steps were taken to introduce such a system in the country (Hadzhiyski, 2020). A pilot project in the city of Slivnitsa in 2007 led to the issuance of the first electronic prescription in Bulgarian history. Following this, the plan was to create electronic health cards on which to load prescription data, which patients would subsequently carry to the pharmacies they visited. There, they would be coupled with a card owned by the pharmacist and finally executed after the pharmacist enters a PIN code for verification on his part (Kontraks, 2007). The project connected local doctors and pharmacies in Slivnitsa but was not further developed and was never implemented at the national level (Tsekulova, 2023). In 2009, Bulgaria reported that it had neither a pilot program nor any plans to implement an e-prescription system in the country (Rautava and Forsstrom, 2011).

This, however, was not the end. The idea persisted and the process of implementing a national e-prescription system in Bulgaria essentially began in 2011, when the National Health Insurance Fund (NZOK) announced the start of a project to introduce an electronic prescription system for medicinal products in Bulgaria (Galeva et al., 2015). According to the vision of the time, electronic health cards were rejected in favor of paper prescriptions with bar codes, which would be issued by the doctor, carried by the patient, and scanned by the pharmacist for execution (NZOK, 2011).

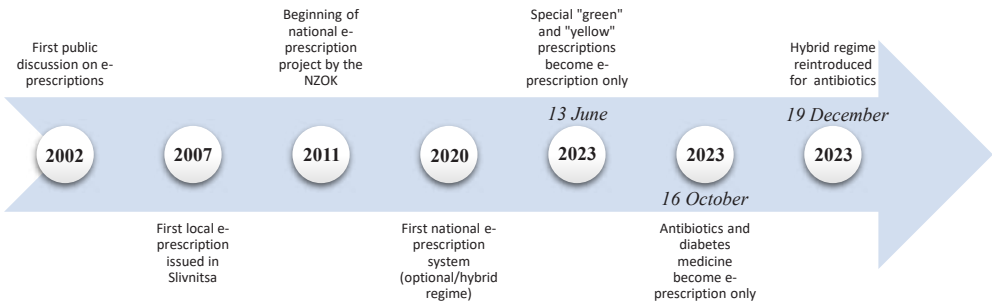
The introduction of such a system encountered a number of technical and regulatory difficulties, and its actual implementation was postponed for years. Significant progress on the topic came in 2020, when the then-pressing contagion of SARS-COV-2, the virus that causes the COVID-19 disease, was declared a global pandemic. This necessitated the digitalization of public services as a measure to limit physical contact between people to contain the spread of infection. On December 18, 2020, the issuance of electronic prescriptions and referrals for visiting a specialist (napravleniya) started. An essential difference between the previous vision and the then introduced system is that the requirement for a paper copy with a bar code was dropped. Prescriptions and referrals to specialists became fully digital. This allowed GPs to prescribe medicines after a telephone consultation without having to examine their patients on-site. Patients could then receive their medication at any pharmacy after telling the pharmacist their full

names and personal identification number (‘unified civic number’ - EGN). Despite this innovation, a period of “hybrid” use was envisaged, during which both the new electronic and the old paper prescriptions and referrals would be used simultaneously. This approach was found to have lowered the threshold for accessing health services by the population at least in the short term (Džakula et al., 2022).

This period was initially scheduled to end at the end of May 2021 (Marinova, Popova, 2020). Due to fears of unpreparedness to work with the system, the incumbent caretaker government decided to make electronic writing mandatory only for prescriptions paid by the National Health Insurance Fund (NZOK). It allowed the continuation of the “hybrid” prescription regime for the rest of the prescriptions (Simova, 2021). The change became a fact on 01.06.2021 when e-prescriptions became mandatory for medicines paid in whole or in part by the NZOK. At the same time, patients’ personal paper prescription booklets were also being replaced by the new electronic prescription records (ERK) (Natsionalno sdruzhenie na obshtopraktikuvashchite lekari, 2021). Subsequently, the state’s main priority concerning electronic prescriptions became the transition to their mandatory introduction of prescribing antibiotics and drugs for diabetes treatment. However, their introduction for this purpose was postponed again due to concerns that patients may be left without medication due to problems with the system (OffNews.bg, 2023). On June 13, 2023, the requirement was introduced that medicines containing narcotic substances, until then prescribed according to the so-called “yellow” and “green” prescriptions, should be prescribed only electronically. The issuance of new paper prescriptions for these medicines was abolished, but the already existing paper “yellow” and “green” prescriptions issued before this date remained usable until their expiration date (National Healthcare system, 2023a).

After repeated postponements, the requirement for antibiotics and diabetes medications to be prescribed only electronically was finally introduced on October 16, 2023 (Ministry of Health, 2023). “Information Services” added that in the form thus introduced, the issuance of an e-prescription does not cancel the need to visit a doctor since prescriptions should be issued after examining the patient. It is also shared that a mobile application (eRx) is envisaged, with which not only doctors but also dentists, veterinarians, and other authorized persons can issue prescriptions at any time and from any place, entirely through an app on their mobile phone, without the need to access a work computer. It should be noted that “Information Services” is the company engaged in the technical development of the then-applied system for electronic prescriptions (Natsionalna zdravnoinformatsionna sistema, 2023b). The change provoked mixed reactions in society, and subsequently there were fears that it may become impossible for emergency

teams to prescribe medication to patients who live in remote areas where there is limited access to the Internet. In response, the Ministry of Healthcare introduced changes to its ordinance to allow the extension of the "hybrid" prescription regime for emergency teams, envisaged to remain until March 2024 (Mediapool.bg, 2023a). Despite the proposed changes, discontent continued, especially on the part of the medical profession. Subsequently, the government decided to temporarily allow the prescription of antibiotics with a paper prescription once again from 19 December 2023 with an expected sunset date of April 1, 2024. However, the obligation for diabetes medicines to be prescribed only electronically, without provision for paper prescriptions, remained in force (Aladzhova, 2023).



Source: Author's figure

Figure 1: Timeline of key developments in the implementation of e-prescriptions in Bulgaria

Figure 1 visually represents some of the key developments in the implementation of the e-prescription system in Bulgaria, with an emphasis on events that had a major impact on the course of events. It also clearly demonstrates the period of hesitation, indecision and stagnation during the pre-pandemic years as opposed to the relatively rapid introduction of e-prescriptions during and after the pandemic.

Benefits and risks associated with access to essential medicines and confidential patient information

As the sale of medicines of specific categories is permitted only to patients with a duly issued prescription, the effects of the system for issuing these prescriptions directly impact the trade in medicines and the pharmacological industry as a branch of the national economy. From patients' point of view, prescriptions represent the level of their access to medicines, which for some of them are vital. For this reason, the effects of the introduction of electronic prescriptions concern not only economic and commercial factors but also the population's access to the

national healthcare system, the provision of which is one of the main functions of the state. In addition, implementing such a system represents a significant change in the functioning of the healthcare system and the state administration related to it. As part of the fulfillment of prescription requirements, large quantities of personal data belonging to patients is processed, including data that falls under the special regime relating to the processing of data related to the health status, sexuality, genetic and biometric data of natural persons under the General Data Protection Regulation (GDPR) (Evropeyski parlament, 2016).

A potential case in which the system for writing electronic prescriptions is compromised, therefore, poses serious risks of restricting the access of vulnerable parts of the population to life-saving medicines, limiting the activities of a large part of an entire economic sector, as well as leading to the leakage of highly personal and sensitive data about individuals, causing them significant damage and creating legal consequences for the state administration and the specific organizations (e.g. hospitals, clinics, pharmacies, regulatory organs within the healthcare system, etc.) responsible for handling the patient data.

These problems are exacerbated by the fact that the system must be freely accessible by doctors, specialists, and pharmacists, including those with private practices, from anywhere in the country, and by people who do not necessarily have experience with similar electronic systems. According to the Health Act, every Bulgarian citizen has the right to affordable medical care (Zakon za zdraveto, ch. 81 (1), 2023). According to the latest National Security Strategy proposed by the Council of Ministers and adopted by the National Assembly in 2018 (Ministerski Savet na Republika Bulgaria, 2018), national security can be considered protected when, among other requirements, Bulgarian citizens' rights are protected. Therefore, anything that could impede this right can also be interpreted as a threat to the state's national security (Darzhavna komisiya po sigurnostta na informatsiyata, 2020).

On the other hand, the implementation of the electronic prescription system represents an opportunity to facilitate bureaucratic processes in healthcare, abolish patients' obligation to keep and carry their prescriptions on paper, reduce the abuse of medicines by means of forged, old, or fake prescriptions, and prevent the use of prescriptions by individuals other than the patients for whom they have been issued.

This is of the highest importance for medicines based on regulated substances that could be used as narcotic substances, antibiotics, and drugs for the treatment of diabetes. In the former, there is a significant risk that the short-term narcotic and/or euphoric effects of the medications may be attractive for unregulated use by individuals for recreational purposes. Such abuse of these substances is not only legally prohibited, but its nature as existing outside the supervision of a

doctor or medical specialist creates the necessary prerequisites for dire consequences for the abusing individual. These have long been well-understood by the medical profession and include the induction of both psychological and chemical dependence to the drug, alongside hallucinations, general deterioration of health, and even death by overdose. The risk of the latter is increased with time as the abusing individual may gradually ramp up the drug's dosage to compensate for the increasing chemical tolerance, which leads to the lessening of its recreational effects as the abuse progresses.

Separately, the unregulated and improper use of antibiotics could lead to the development of antibiotic resistance, which would dangerously decrease the effectiveness of the antibiotics against the bacterial infections they are designed to treat. The fight against the misuse and abuse of antibiotics is essential for the Bulgarian state, as studies show that Bulgaria is among the countries with the highest incidence of unregulated antibiotic self-medication in Europe (43%) (Lebanova et al., 2023). A survey conducted in 2018 in the city of Stara Zagora concluded that 47% of respondents had taken an antibiotic in the last year, of which 14% had obtained it in an unregulated way (purchased illegally without a prescription, taken a prescription issued to an acquaintance/relative, or used leftover antibiotics from a previous course).

The trend is observed, albeit on a more limited scale, even in the more educated population segments. A survey conducted in the spring of 2022 among 516 respondents, of whom 58.9% had a Master's degree, and 17.2% had a Bachelor's degree, living mainly in large cities and with an income level above the national norm, shows that although most respondents are aware of antibiotic resistance, more than a quarter would still take antibiotics without having an up-to-date prescription for them (Zaykova et al., 2022). A study conducted by the sociological agency Trend for the Bulgarian Doctors' Union in 2022 published results showing that 44% of respondents admitted to buying antibiotics without a prescription, with 55% saying they knew a relative who had done the same (Plovdiv24.bg, 2023). What makes this issue worse is the fact that antibiotic prescriptions in the country are already given out in a lax manner. A 2024 study found that general practitioners were already overprescribing antibiotics to children without comprehensive tests, particularly before weekends and national holidays (Zaykova et al., 2024). This creates an environment in which it is relatively easy to obtain a leftover prescription from a friend or relative. The start of the COVID-19 pandemic was shown to make this issue worse, with antibiotic prescriptions given out even more liberally (Nikolova et al., 2023).

Worryingly, a publication in the world-famous journal "The Lancet" in 2022 shows that Bulgaria has the highest mortality rate due to fully antibiotic-resistant E. coli and K. pneumoniae cases of all countries studied, 7.29 and 4.59 deaths

per 100,000 people, respectively (Tomislav et al, 2022). The development of antibiotic-resistant diseases risks creating enormous risks for the Bulgarian health system, as well as for the health of the Bulgarian population as a whole. On the other hand, introducing practical measures to address this problem would allow the state administration in the health sector to improve its efficiency and better fulfill its role in serving the needs of the Bulgarian population.

Another significant problem that warranted policymakers' attention arose at the end of 2022 and was the misuse of diabetes drugs. Around this period, there has been a substantial increase in demand for certain diabetes medications, significantly above expected levels. This is due primarily to the popularization of some of them, most notably Ozempic, as weight loss aids. This is a global trend, with such drugs being abused by people, having neither a prescription, nor a medical need for the drug, in hopes of "taking advantage" of their side effects, which often include weight loss. The increased demand leads to a decrease in the quantities of these drugs available to people with diabetes who have a vital need for them, as they depend on them to treat life-threatening conditions. The problem worsens in 2023, when an alarmingly low amount of Ozempic, as well as similar drugs, is noticed in the pharmacy network in Bulgaria. In this regard, the Ombudsman of the Republic of Bulgaria referred this matter to the Minister of Healthcare (Ombudsman na Republika Bulgaria, 2023). In addition to being a potential solution to the issues described above, e-prescriptions also significantly reduce the possibility of dispensing wrong or incorrectly dosed drugs to a patient based on a misunderstood or illegibly written paper prescription.

Reception of e-prescriptions and digitalization in the health sector

Indicators regarding the reception of e-prescriptions showed a generally positive outlook at the beginning of the nationwide rollout by 2020 and 2021. An inquiry conducted in 2021 showed that although slightly less than half of stakeholders from the country's health and pharma sectors actively followed the developments, two thirds believed that the ongoing digitalization process would improve the work of practitioners in the healthcare sector (Dimitrova et al., 2023).

Nevertheless, the introduction of electronic prescriptions, especially regarding their mandatory use for the issuance of "white" prescriptions, met significant resistance from doctors' associations and led them into a dispute with associations representing the interests of pharmacists. In an interview with a pharmaceutical publication, the Secretary General of the Bulgarian Pharmaceutical Union said in April 2022 that out of the 12 million electronic prescriptions issued until that point, the share of "white" prescriptions (which were able, but not required to be prescribed digitally, unlike other prescriptions) represented an "insignificant" part of the total. He reported that some medical practices do not conform to this trend and

write almost all their prescriptions electronically, but he considers them a minority. He argued that such cases are rare and opined that this might lead to the conclusion that the "hybrid" prescription model is not working (Farmatsevt, 2022).

Disagreements also happened on other issues. It continued to be a common practice for many doctors to prescribe medicines under a trading name instead of an international non-patent name. This practice has the practical effect of obliging pharmacies to dispense only the medicine of the specifically prescribed brand. It excludes the possibility of replacing it with a chemically identical medicine produced under another brand (generics). This led to a significant number of returned patients whose prescriptions could not be fulfilled because the pharmacy did not have the drug of the specifically prescribed brand in its current inventory and was not permitted to replace the medicine with a generic analog. The Pharmaceutical Union, as cited by Mediapool, insisted for a normative requirement to allow generic replacement with patient consent and a mandatory offer of all alternatives in the pharmacy as a way to increase access to drug therapy. At the same time, the Association of General Practitioners claimed that attempts to substitute medicines are "attempts to seize control over the determination of [a patient's] treatment" and that only the attending physician, who is said to have known his patient for years, could and should decide whether a particular drug can be replaced with a generic. According to the Association, there are "bio-psycho-social" aspects in medical practice, such as inactive ingredients (which could be brand-specific), the patient's medical history and personal attitudes towards a particular medication, among others, that might affect his compliance with a given treatment, even if an identical generic analog is available (Bozukova, 2023a). For its part, the Bulgarian Doctors' Union (BDU) opposed the mandatory introduction of "white" e-prescriptions. In a statement made to the media in November 2023, the head of the BDU declared the inability of 70% of doctors in Bulgaria to issue e-prescriptions due to a lack of registration as a medical institution. According to the BDU, the new electronic prescriptions would not restrict the use of antibiotics and may lead to a violation of patients' rights. For these reasons, the professional organization insisted on continuing the "hybrid" model, in which "white" prescriptions can be prescribed both electronically and on paper (Nova.bg, 2023).

A statement published on the professional organization's website expressed the opinion that there was a lack of accountability and control over the activity of the pharmaceutical sector. The chairman of the organization again made recommendations, including the temporary restoration of the "hybrid" dispensing model, blocking open e-prescriptions until the pharmacist registers activity, introducing control over inventory stocks by the state, creating an electronic platform for monitoring the availability of medicinal products in Bulgaria and others (Balgarski Lekarski

Sayuz, 2023). In a separate position published to the media a day after the introduction of mandatory e-prescriptions for antibiotics and diabetes drugs, and cited by BTVNovinite on 17.10.2023, the BDU claimed that it was "overwhelmed" by reports from doctors and patients who shared that some pharmacists returned patients "en masse" and did not dispense their prescriptions with the explanation that the prescribed medication was not available in the pharmacy. According to the BDU statement, they interpreted this as indicative that in the case of paper prescriptions "massive" numbers of prescriptions were filled with something other than what was prescribed. The statement claimed that "commercial interest drives the change in drug therapy" and declared that Bulgarian doctors would "refuse to work under the dictate of pharmacies" (Btvnovinite.bg, 2023).

The media published a response from pharmaceutical industry representatives, stating that pharmacies cannot dispense medicines that are unavailable. They recommended that doctors start using the international patent name instead of the trade/brand name in prescriptions, which they said would allow pharmacies to find an analogous drug for the patient (Btvnovinite.bg, 2023). In contrast to the doctors' associations, most pharmacists' unions appear to have taken the side in favor of electronic prescriptions. As part of the public discussion of one of the regulations related to the introduction of electronic prescriptions at the end of summer 2023, the Regional Pharmaceutical College of Sofia published an opinion (Getov, 2023) in which it announced its firm support for the idea, adding that it has supported the concept of introducing an electronic prescription for more than 15 years as of the date of publication of the opinion.

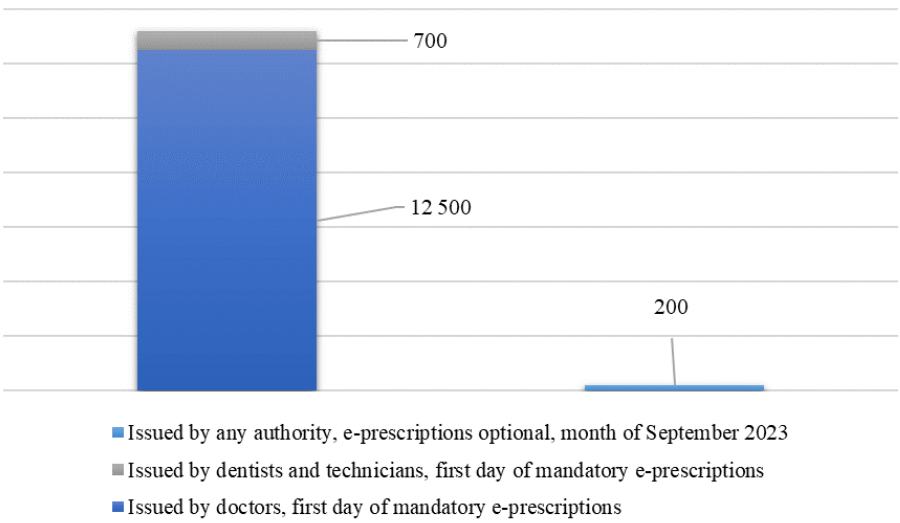
The large emphasis on generics in this debate leads to an impression that the disagreement seems to be largely over generic substitution more so than any other factor. Doctors appear to want stricter control over such substitutions, while pharmacists want more leeway. This would mean that this disagreement, at its core, has more to do with regulations than any specific technical issue regarding the e-prescription system.

Most other views on the ordinance in question also express a generally favorable opinion toward electronic prescriptions in Bulgaria. However, most desire changes in the writing systems and/or regulations. The Bulgarian Pharmaceutical Union (BPU) came out with a public position, aiming to respond to the position of the BDU. In it, the BPU insisted that there should be no return to the "hybrid" prescribing model, but instead that the mandatory prescription of antibiotics and diabetes medications should be continued by transitioning to entirely electronic prescriptions (Balgarsko Natsionalno Radio, 2023).

Quantitative indicators

Mixed signals are also available for quantitative indicators related to the effects of the introduction of e-prescriptions. After introducing the "hybrid" regime for prescribing medicines, outside the list of those funded by the NZOK, a significant number of doctors refused to use the new system, except in cases in which they were forced to do so. According to data from the Bulgarian Pharmaceutical Union (BPU), quoted by the Mediapool news agency and published in 2022, there were medical practices that, after issuing more than 100,000 electronic prescriptions for medicines financed by the NZOK, in which case electronic prescriptions are mandatory, have only one prescription issued for medicines outside this list, where the issuance of an e-prescription is only optional. This assertion implies that these medical practices would only prescribe electronically if forced to and given no alternative.

According to the same data, another practice with over 80,000 electronic prescriptions under the NZOK did not have a single electronic prescription issued outside this mandatory e-prescription list (Bozukova, 2022b). According to data from Information Services, published in the National Health Information System, between 2020 and October 16, 2023, nearly 40 million electronic prescriptions were issued, of which only 50 thousand were "white" (until then, not mandatory for issuance in electronic format).

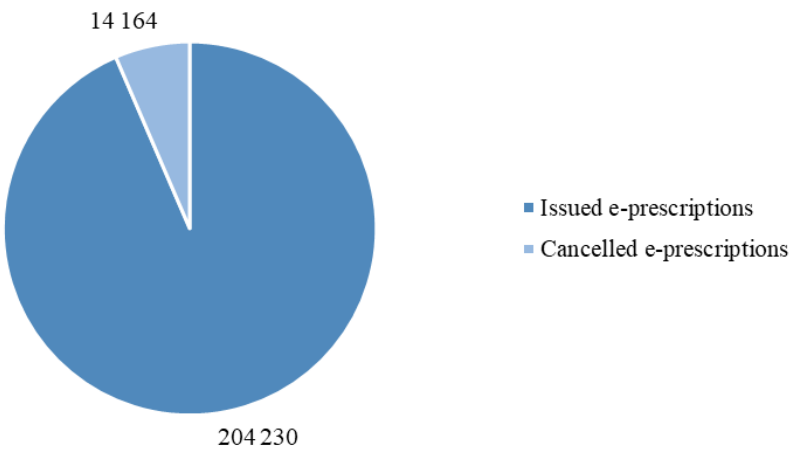


Source: Author's figure based on data from the National Health Information System

Figure 2: "White" e-prescriptions issued by type and time period

Figure 2 demonstrates the disparity between the usage of the system for "white" e-prescriptions between periods of time in which such use is voluntary, when compared to compulsory. The large disparity between the two is clear. On the first day of the introduction of compulsory electronic "white" prescriptions, the total number issued exceeded 12,500 by doctors and 700 by dentists, dental technicians, and other dental specialists. In contrast, in September 2023, no more than 200 electronic "white" prescriptions were issued during the whole month (Natsionalna zdravnoinformatsionna sistema, 2023b). The need to apply mandatory measures before the system is significantly adopted can be interpreted as a major reluctance on the part of the medical profession to use it. However, the sharp peak in usage after the introduction of the system's mandatory nature indicates that it can nevertheless be used by a large part of the medical profession.

During a hearing in the Health Committee of the National Assembly on October 23, 2023, the Deputy Minister of Healthcare commented that a week after the introduction of electronic prescriptions, a decrease in the use and sale of antibiotics was reported, equal to between 25 and 35 percent (Komisiya po zdraveopazvaneto, 2023). This would mean significantly exceeding the previously set target of reducing the use of antibiotics without a prescription by 5%, announced by the minister about two weeks earlier during a meeting with doctors and pharmacists (Mediapool.bg, 2023b).

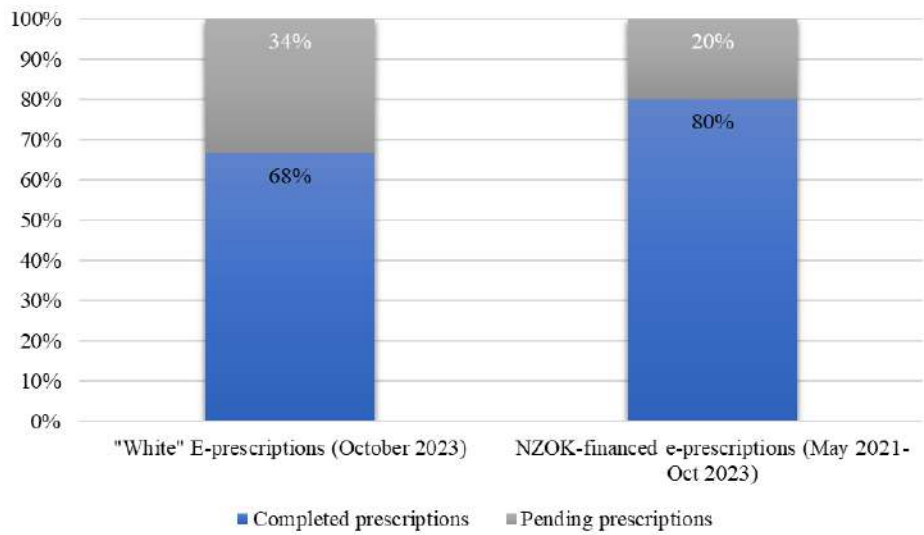


Source: Author's figure based on data from the BDU as cited by "Trud"

Figure 3: Issued and canceled e-prescriptions, Oct 16-30, 2023

Figure 3, made according to initial data announced by the BDU as cited by "Trud", from October 16 to October 30, 2023, 204,230 e-prescriptions were issued, 14,164 of which were canceled. This data allows us to calculate that the percentage of canceled prescriptions for the relevant period was just over 6.9% (Trud, 2023, p. 14). The BPU did not dispute these figures but stated that they believe the cancellations of e-prescriptions could be due to "many doctors committing errors in prescribing and cancelling the prescriptions" (Balgarsko Natsionalno Radio, 2023a). According to the hearing, the share of canceled prescriptions had already been reduced to 2% by October 23 (Komisiya po zdraveopazvaneto, 2023).

If both indicators are correct, this would lead to the hypothesis that the number and, accordingly, the proportion of canceled prescriptions was significantly higher in the first days after the introduction of electronic "white" prescriptions, and subsequently this indicator was improved considerably. Such a hypothesis would explain the two indications. Notably, due to the limited time between these events and the compilation of the current study, it is impossible to fully confirm the truth of one or both statements containing the indicators in question.



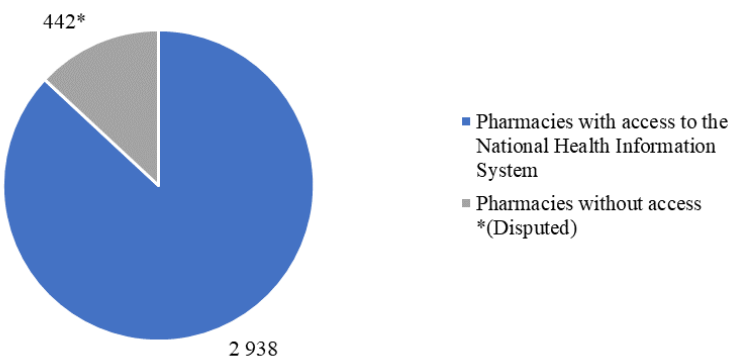
Source: Author's figure based on data from the parliamentary committee for health

Figure 4: Fulfilment rate comparison between mandatory e-prescriptions and prescriptions in general

Figure 4 compares the proportion of completed to pending prescriptions for both "white" and NZOK-financed issuances. The data is taken from the Executive

Director of Information Services, who announced that as of October 23, 2023, the percentage of completed e-prescriptions had reached 68% of the total number of e-prescriptions issued, not counting canceled prescriptions or exceptional cases. For comparison, the rate of NZOK-funded completed e-prescriptions in the period from May 2021 until October 2023 was just over 80% (Komisiya po zdraveopazvaneto, 2023).

This gives us grounds to conclude that there is a particular discrepancy between the proportion of completed e-prescriptions funded by the NZOK, the use of which has been mandatory for several years, with the implementation of "white" e-prescriptions, the application of which became compulsory about two weeks before the meeting. It should be noted that the discrepancy in question is not significant and that such a discrepancy is expected in the initial phase of the implementation of any such novel system. It should also be noted that there is a possibility that patients themselves could postpone the fulfillment of their prescriptions since the price of medicines for this type of prescription is paid for by themselves, as opposed to prescriptions financed by the NZOK, which the Health Insurance Fund partially or fully pays for and as such are either discounted or free for patients. A possible motive for this is that a patient with such a prescription could delay going to the pharmacy so as to obtain funds with which to pay. This would not be wholly unexpected, as Bulgaria is one of Europe's poorest countries, and many individuals might struggle to afford expensive medicines. Shortly before the start of the pandemic, Bulgaria's rate of unfulfilled prescriptions due to financial factors was 9.6% – a very high indicator when compared to the EU average of 4.6% (Minev, 2019).



Source: Author's figure based on Bulgarian Doctors' Union statement as cited by "Trud"

Figure 5: Doctors' Union view of pharmacies with access to the National Health Information System as of 02/11/2023

Figure 5, in contrast to the aforementioned data points that concern either prescribing doctors or the NZOK, represents the integration of the system with regards to pharmacies. According to the Bulgarian Doctors' Union, as of 2 November 2023, 2938 out of 3380 pharmacies had access to the National Health Information System, where citizens' health data, including e-prescriptions, is stored. According to the same BDU statement, should their concerns not be addressed, legal action could be taken (Trud.bg, 2023, p. 14). Though this data appears to show an alarming gap, parts of it were disputed by the BPU with a statement on 03/11/2023. Though the BPU confirmed that 2938 pharmacies indeed had access to the system and filled e-prescriptions, they disputed the BDU's findings. According to the BPU, there were only 3230 active pharmacies in the country. Out of those, they stated 198 were hospital pharmacies, which do not use "white" e-prescriptions, while 72 were said to be pharmacies run by assistant-pharmacists, who are legally not allowed to sell prescription medications. The statement suggests that the remaining 22 pharmacies hadn't filled e-prescriptions simply because it was possible they were not visited by a single patient that had one in that timeframe (Balgarsko Natsionalno Radio, 2023a).

Table 1 compares the indicators of the Bulgarian e-prescription system with indicators from other European countries. This data is taken from a publication by the University of Oxford in June 2016 (Deetjen, 2016). They are considered relevant due to the close indicators of three of the four countries studied in terms of population size and characteristics of the national healthcare system. Population data updated to 1 January 2024 values according to Eurostat indicators (Eurostat, 2024).

Table 1: Overview of country case studies in e-prescription rollouts

	Estonia	United Kingdom	Sweden	Denmark	Bulgaria
E-recipes as a proportion of common recipes	>99%	<43% (Original 2016 value) >95% (2023)	>90% (Original 2016 value) >99% (2023)	>99%	100% of new prescriptions under the National Health Insurance Fund (NZOK) for diabetes medicines <1% "white" recipes outside the above categories
Year of introduction of e-prescriptions	2010	First phase: 2005 Second phase: 2012	Start: 1983 Central Introduction: 2000	1992	2020
Structural features					
Population	1.3 million	69 million	10.5 million	5.9 million	6.4 million
Insurance structure	Single public payer				
Healthcare structure	Private	Mostly public	Public and private	Mostly public, some private	Public and private
Pharmacies	Private	Mostly private	Public until 2009, then private	Private	Mostly private, some municipal
Implementation strategy					
Method of administration	"Big Bang" approach	Decentralized, based on individual choice	First in the capital, then regionally	Phased, combined with computerization of systems	Step-by-step, with priority to state-funded medicines
Functionality	All functionalities available at the beginning	Introduced in several phases	Some functionalities introduced in stages	Some functionalities introduced in stages	Functionalities introduced in stages

Source: Ulrike Deetjen (University of Oxford), modified by author with data from current study

Results and Discussion

The comparison clarifies the most significant differences between the e-prescription system in Bulgaria and comparable countries. Although debates on the topic have existed in the country since 2002, the beginning of the introduction of such a system in Bulgaria took place over a decade later. The country is lagging in this aspect of digitalizing state institutions and administration, as well as the healthcare system. However, in Bulgaria, there is an emphasis on introducing e-prescriptions for medicines partially or fully paid by the NZOK, indicating a policy priority in the digitalization of public administration and for purposes related to the accountability of state and public expenditures.

Another clear dividing line is observed in the way electronic prescriptions are perceived. In Bulgaria, a certain level of radicalization can be noted in this aspect. When electronic prescriptions are mandatory for a particular category of medicines, the system appears to mostly work as intended. When a "hybrid" mode is implemented, allowing doctors to decide for themselves whether to use electronic or paper prescriptions, the electronic version is only chosen by a small number of them, the majority preferring the traditional paper prescriptions. According to the BDU, a total ban on the use of paper prescriptions in the EU exists only in Estonia, while other countries, including those described in Fig. 1, allow for a "hybrid" regime (Bozukova, 2022c). However, doctors in these countries' adoption of e-prescriptions demonstrates their willingness to work with the system, even when they are not forced to do so. This demonstrates a clear separation between the medical profession's requirements and expectations for working with the system and its implementation in reality.

Although the disputes between the medical and pharmaceutical professions bring some confusion to society, the currently available data lead to the conclusion that the system thus introduced does not impede access to medical care, described as a right of Bulgarian citizens under the Health Act. As of the date of the study, there is no publicly available information on data leaks from the electronic prescription system. For these reasons, the author assumes that, at this time, there has been no serious violation of national security resulting from the introduction of the electronic prescription system in Bulgaria.

However, there are opportunities for obstacles to be created concerning the unobstructed sale of medicines, especially antibiotics, even when they are appropriately prescribed. Doctors' inability to monitor the actual availability of drugs in pharmacies, combined with their aforementioned reluctance to use international non-patent numbers in their prescriptions to allow the issuing of generic substitutes, could lead to situations where patients cannot obtain their therapy due to inventory issues through no fault of their own. This can pose a risk to public health if it leads to untimely treatment of diseases in the population. In addition,

this would also harm the financial performance of pharmacies in Bulgaria, which could have an additional adverse effect on this economic sector.

Recommendations

Based on the results of this study, the following recommendations are made to the state government and administration.

First, in connection with the digitalization and modernization of the state administration and the healthcare system:

- The implementation of the e-prescription system should not stop, but should adjust. Examples from other countries show an explicit acceptance of these systems after an initial adjustment period.
- Create a platform for structured dialogue between representatives of the Health Ministry, BDU, BPU and Information Services to implement physician and pharmacist-centric technical changes in the system, better adapting it to the needs of the medical profession and improving its voluntary use even outside of cases in which its use is mandatory.
- Emphasize current and subsequent control as an element of system implementation to deal with emerging problems in a timely manner and improve the system's overall operation.

Second, in connection with guaranteeing the rights of citizens under the law on health and protection of the well-being of the population as an element of national security:

- Focus on ensuring the correct operation of the e-prescription system when used by emergency medical staff and improving their training to handle the system's operation even under conditions of a lack of Internet connectivity. The temporary introduction and/or extension of a "hybrid" regime for several months is a permissible compromise until tangible results are achieved.
- Introduce a requirement for the mandatory use of e-prescriptions in case the state decides to continue with digitalization, or focus on mandatory collection and accounting of paper prescriptions from pharmacists, along with their reporting to the NHIS, if the state chooses to postpone this priority and instead focuses on paper prescriptions, in order to limit the abuse of antibiotics.
- Continue the requirement that medicinal products for the treatment of diabetic conditions occur entirely through e-prescriptions or, in the case of the introduction of a "hybrid" regime, only with the collection and reporting of prescriptions collected by pharmacists to limit the abuse of these medicines for unregulated purposes, at least as long as that these

medicines are in short supply or their timely procurement cannot be guaranteed for patients from all over the country.

Third, given the importance of the proper functioning of the medicines trade as a branch of the national economy and the societal benefit of achieving consensus between doctors and pharmacists:

- Create an electronic system for monitoring the pharmacy inventories and medicine availability, which can be accessed by both pharmacists and doctors, to avoid the prescription of medicines that are not readily available in the geographic and administrative areas in which they are prescribed.
- Conduct an explanatory campaign in the medical profession to encourage the voluntary use of international non-proprietary names of medicinal products instead of brand names in cases where this would be relevant and beneficial to the patient. This will ensure the possibility of substituting unavailable medicinal products with generic analogs when such substitution corresponds to the treatment prescribed by the doctor and will not compromise its course or patients' attitudes towards it.

These last two policies taken together have the additional benefit of implementing one of the doctors' and pharmacists' representatives' key proposals each, thus improving cross-sectional dialogue and making it easier for the two sides to agree to a mutually beneficial compromise.

Conclusion

The introduction of e-prescriptions in Bulgaria been rocky to say the least. Having faced numerous delays and surmounted considerable institutional resistance to change, the COVID-19 pandemic finally became the cause célèbre that led to the widespread national adoption of an e-prescriptions system after nearly two decades of delays and stagnation. Such rapid digitalization expectedly caused some technical issues, most of which were eventually resolved. However, differences in opinion regarding the design choices of the system and how it should be implemented have led to widely diverging reactions from pharmacists as opposed to other medical personnel. Nevertheless, the system is proving effective in key areas, such as limiting the abuse of antibiotics and diabetes medicines and reducing reliance on paper-based bureaucracy. The risks and dangers posed by data leaks have so far been successfully managed. The further development of the e-prescription system in the country can be viewed with cautious optimism.

Acknowledgments

The listed author is the sole author of this study. He thanks Assoc. Prof. Dr. Georgi Penchev, for his guidance and valuable advice.

References

Аладжова, М. (2023). Отново изписват антибиотици и с хартиена рецепта, BTV Новините, [online], (Aladzhova, M., 2023, Otnovo izpisvat antibiotici i s hartiena retsepta, BTV Novinite), available at: www.btvnovinite.bg/bulgaria/otnovo-izpisvat-antibiotici-i-s-hartiena-recepta.html

Бозукова, М. (2023a). Измъчен старт на е-рецептите за антибиотиците, Mediapool.bg. (Bozukova, M., 2023, Izmachen start na e-retseptite za antibiotitsite, Mediapool.bg), available at: https://www.mediapool.bg/izmachen-start-na-e-retseptite-za-antibiotitsite-news352423.html

Бозукова, М. (2022b). Лекарите масово бойкотират електронните рецепти, когато не са по НЗОК, Mediapool.bg [online], (Bozukova, M., 2022a, Lekarite masovo boikotirat elektronnite retsepti, kogato ne sa po NZOK, Mediapool.bg), available at: https://www.mediapool.bg/lekarite-masovo-boikotirat-elektronnite-retsepti-kogato-ne-sa-po-nzok-news340148.html

Бозукова, М. (2022c). Лекарският съюз: 58% от хората искат да има и хартиени, и електронни рецепти [online]. Mediapool.bg, (Bozukova, M., 2022b, Lekarskiyat sayuz: 58% ot horata iskat da ima i hartieni i elektronni retsepti, Mediapool.bg), available at: https://www.mediapool.bg/lekarskiyat-sayuz-58-ot-horata-iskat-da-ima-i-hartieni-i-elektronni-retsepti-news339671.html

Btvnovinite.bg. (2023). Фармацевтите масово връщат пациенти и не изпълняват електронните им рецепти, BTV Новините, [online],(Btvnovinite.bg, 2023, Farmatsevite masovo vrashtat patsienti i ne izpalnyavat elektronnite im retsepti), available at: www.btvnovinite.bg/bulgaria/farmacevtite-masovo-vrashtat-pacienti-i-ne-izpalnjavat-elektronnite-im-recepti.html

Български Лекарски Съюз. (2023). БЛС: В България липсва достатъчно информация за движението на лекарства, (Balgarski Lekarski Sayuz, 2023, BLS: V Bulgaria lipsva dostatachno informatsiya za dvizhenieto na lekarstva), available at: https://blsbg.com/bg/bls-v-blgariia-lipsva-dostatchno-informatsiia-za-dvizhenieto-na-lekarstva_p11804.html

Българско Национално Радио. (2023). Българският фармацевтичен съюз с позиция за електронните рецепти, [online], (Balgarsko Natsionalno Radio, 2023, Balgarskiyat farmatsevtichen sayuz s pozitsiya za elektronnite retsepti), available at: https://bnr.bg/post/101893175/balgarskiat-farmacevtichen-sauz-s-pozicia-za-elektornnite-recepti

Българско Национално Радио. (2023a). Българският фармацевтичен съюз опровергава данни на БЛС за електронните рецепти, [online], (Balgarsko Natsionalno Radio, 2023, Balgarskiyat farmatsevtichen sauz oprovergava danni na BLS za elektronnite retsepti), available at: https://bnr.bg/post/101902317/

balgarskiat-farmacevtichen-sauz-oprovergava-danni-na-bls-za-elektronnite-recepti

Гетов, И. (2023). Справка за отразяване на становищата, получени в рамките на обществено обсъждане на проект на Наредба за допълнение на Наредба № 4 от 2009 г. за условията и реда за предписване и отпускане на лекарствени продукти, (Getov, I., 2023, Spravka za otrazjavane na stanovishchata, polucheni v ramkite na obshtestveno obsuzhdane na proekt na Naredba za dopalnenie na Naredba № 4 ot 2009 g. za usloviyata i reda za predpisvane i otpuskane na lekarsveni produkti), available at: https://www.strategy.bg/FileHandler.ashx?fileId=29408

Гълева, С., Григоров, Е., Данова, Н. (2015). Анализ на практиките в Европа и възможностите за прилагането им в България. Юбилейна Научна Конференция Пловдив. (Galeva, S., Grigorov, E., Danova, N., 2015, Analiz na praktikite v Evropa i vazmozhnostite za prilaganeto im v Bulgaria, Yubileyna Nauchna Konferentsiya Plovdiv).

Държавна комисия по сигурността на информацията. (2020). Сборник лекции - първоначално обучение, Трето допълнено издание, София. (Darzhavna komisiya po sigurnostta na informatsiyata, 2020, Sbornik lektsii - parvomachalno obuchenie, Treto dopalneno izdanie, Sofia).

Европейски парламент. (2016). Регламент (ЕС) 2016/679 на Европейския парламент и на Съвета от 27 април 2016 година относно защитата на физическите лица във връзка с обработването на лични данни и относно свободното движение на такива данни и за отмяна на Директива 95/46/ЕО (Общ регламент относно защитата на данните). (Evropeyski parlament, 2016, Reglament (ES) 2016/679 na Evropeyskia parlament i na Saveta ot 27 april 2016 godina otnosno zashtitata na fizicheskite litsa vav vrazka s obrabotvaneto na lichni danni i otnosno svobodnoto dvizhenie na takiva danni i za otmyana na Direktiva 95/46/EO (Obsht reglament otnosno zashtitata na dannite).

Закон за здравето. // В сила от 01.01.2005 г., обн. ДВ. бр.70 от 10 август 2004 г., изм. ДВ. бр.102 от 8 Декември 2023г. (Zakon za zdraveto. // V sila ot 01.01.2005 g., obn. DV. br.70 ot 10 avgust 2004 g., izm. DV. br. 102 ot 8 dekemvri 2023 g.).

Народно събрание на Република България, Комисия по здравеопазването. (2023). Протокол № 18 - 23/10/2023 от редовно заседание на Комисията по здравеопазването в четиредесет и деветото Народно Събрание, (Narodno Sabranie na Republika Bulgaria, Komisiya po zdraveopazvaneto, 2023, Protokol № 18 - 23/10/2023 ot redovno zasedanie na Komisiyata po zdraveopazvaneto v chetirideset i deveto Narodno Sabranie), available at: https://www.parliament.bg/bg/parliamentarycommittees/3215/steno/7611

Контракс. (2007). В Сливница бе издадена първата електронна рецепта, (Kontraks, 2007, V Slivnitsa be izdadena parvata elektronna retsepta), available at: https://www.kontrax.bg/bg/news-view/v-slivnitsa-be-izdadena-parvata-elektronna-retsepta

Маринова, Е., Попова, Д. (2020). Стартира издаването на електронни рецепти, Investor.bg, [online], (Marinova, E., Popova, D., 2020, Startira izdavaneto na elektronni retsepti, Investor.bg), available at: https://www.investor.bg/a/332-ikonomika-i-politika/318269-startira-izdavaneto-na-elektronni-retsepti

Mediapool.bg. (2023a). Спешните медици ще ползват и хартиени рецепти до март 2024 година, Mediapool.bg, [online], (Mediapool, 2023a, Speshnite meditsi shte polzvat i hartieni retsepti do mart 2024 godina, Mediapool.bg), available at: https://www.mediapool.bg/speshnite-meditsi-shte-polzvat-i-hartieni-retsepti-do-mart-2024-godina-news352686.html

Mediapool.bg. (2023b). МЗ ще счита за успех, ако намали дори и с 5% употребата на антибиотици без рецепта, Mediapool.bg, [online], (Mediapool.bg, 2023b, MZ shte schita za uspeh, ako namali dori i s 5% upotrebata na antibiotitsi bez retsepta, Mediapool.bg), available at: https://www.mediapool.bg/mz-shte-schita-za-uspeh-ako-namali-dori-i-s-5-upotrebata-na-antibiotitsi-bez-retsepta-news352247.html

Министерски Съвет на Република България, (2018). Актуализирана стратегия за национална сигурност на Република България, (Ministerski Savet na Republika Bulgaria, 2018, Aktualizirana strategia za natsionalna sigurnost na Republika Bulgaria, available at: https://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=1646

Министерски Съвет на Република България. (2016). Пътна карта за изпълнение на Стратегия за развитие на електронното управление в Република България за периода 2016 – 2020 г. приета с решение №983/15.11.2016. (Ministerski Savet na Republika Balgariya, 2016, Patna karta za izpalnenie na Strategiya za razvitie na elektronnoto upravlenie v Republika Bulgaria za perioda 2016 – 2020 g. prieta s reshenie №983/15.11.2016).

Министерски Съвет на Република България. (n.d). Национална стратегия за електронно здравеопазване и дигитализация на здравната система – 2030 г. (Ministerski Savet na Republika Balgariya, n.d., Natsionalna strategiya za elektronno zdraveopazvane i digitalizatsiya na zdravnata sistema – 2030 g.).

Министерство на Здравеопазването. (2023). Лекарствата за диабет и антибиотиците ще се изписват само с е-рецепта от 16 октомври, (Ministerstvo na Zdraveopazvaneto, 2023, Lekarstvata za diabet i antibiotitsite shte se izpisvat samo s e-retsepta ot 16 oktomvri), available at: http://mh.government.bg/bg/novini/aktualno/lekarstvata-za-diabet-i-antibioticite-10-10-23/

Наредба № 4 от 4 март 2009 г. за условията и реда за предписване и отпускане на лекарствени продукти. Издадена от министъра на здравеопазването. Обн. ДВ. бр. 21 от 20 март 2009 г., изм. и доп. ДВ. бр.105 от 19 Декември 2023г. (Naredba № 4 ot 4 mart 2009 g. za usloviyata i reda za predpisvane i otpuskane na lekarstveni produkti. Izdadena ot ministara na zdraveopazvaneto. Obn. DV. br. 21 ot 20 mart 2009 g., izm. i dop. DV. br. 105 ot 19 dekemvri 2023g.), available at: https://lex.bg/laws/ldoc/2135624465

Национална агенция за приходите. (2023). Здравната вноска за безработните вече е 31,20 лв. месечно, (Natsionalna agentsiya za prihodite, 2023, Zdravnata vnoska za bezrabotnite veche e 31,20 lv. mesechno), available at: https://nra.bg/wps/portal/nra/actualno/Zdravnata-vnoska-za-bezrabotni-veche-e-31-20

Национална здравноинформационна система. (2023a). Жълтите и зелените рецепти вече са електронни, (Natsionalna zdravnoinformatsionna sistema, 2023a, Zhalttite i zelenite retsepti veche sa elektronni), available at: https://www.his.bg/bg/news/62

Национална здравноинформационна система. (2023b). Над 13 хил. са издадените електронни „бели“ рецепти през НЗИС за ден, (Natsionalna zdravnoinformatsionna sistema, 2023b, Nad 13 khil. sa izdadenite elektronni „beli“ retsepti prez NZIS za den), available at: https://www.his.bg/bg/news/72

Национално сдружение на общопрактикуващите лекари. (2021). Въвеждане в експлоатация на електронна рецептурна книжка (ЕРК) и извеждане от употреба на хартиената рецептурна книжка, (Natsionalno sdruzhenie na obshtopraktikuvashchite lekari, 2021, Vavezhdane v eksploatatsiya na elektronna retsepturna knizhka (ERK) i izvezhdane ot upotreba na hartienata retsepturna knizhka), available at: https://www.nsoplb.com/poziciya/vyvezhdane-v-eksploataciya-na-elektronna-recepturna-knizhka-erk-i-izvezhdane-ot-upotreba-na-hartienata-recepturna-knizhka

Nova.bg. (2023). БЛС настоява за паралелно използване на хартиени и електронни рецепти, nova.bg [online], (Nova.bg, 2023, BLS nastava za paralelno izpolzvane na hartieni i elektronni retsepti), available at: https://nova.bg/news/view/2023/11/02/431583/блс-настоява-за-паралелно-използване-на-хартиени-и-електронни-рецепти

Омбудсман на Република България. (2023). Омбудсманът сезира МЗ за голям недостиг на инсулин, липсва и „Оземпик“, ползван за отслабване, (Ombudsman na Republika Bulgaria, 2023, Ombudsmanat sezira MZ za golyam nedostig na insulin, lipsva i „Ozempik“, polzvan za otslabvane), available at: https://www.ombudsman.bg/bg/n/ombudsmanat-sezira-mz-za-golyam-nedostig-na-2080

Offnews.bg, (2023). Изписването на инсулин и антибиотици с е-рецепта се отлага – Здраве, Offnews.bg, [online], (Offnews.bg, 2023, Izpisvaneto na in-

sulin i antibiotitsi s e-retsepta se otlaga – Zdrave, Offnews.bg, available at: https://offnews.bg//zdrave/izpisvaneto-na-insulin-i-antibiotitci-s-e-retcepta-se-otlaga-809582.html

Plovdiv24.bg. (2023). БЛС: 70% от лекарите нямат възможност да издават е-рецепти Пловдив24, [online], (Plovdiv24, 2023, BLS: 70% ot lekarite nyamat vuzmozhnost da izdavat e-recepti, Plovdiv24), available at: https://www.plovdiv24.bg/novini/Bylgaria/BLS-70-ot-lekarite-nyamat-vuzmozhnost-da-izdavat-e-recepti-1881451

Симова, А. (2021). Новият здравен министър удължава живота на хартиените рецепти, Economic, [online], (Simova, A., 2021, Noviyat zdraven ministar udalzhava zhivota na hartienite retsepti, Economic), available at: https://www.economic.bg/bg/a/view/novijat-zdraven-ministyr-udyljava-jivota-na-hartienite-recepti

Труд. (2023). Над 14 000 е-рецепти са били анулирани – Труд, Вестник Труд [online], (Trud, 2023, Nad 14 000 e-retsepti sa bili anulirani – Trud, Vestnik Trud), available at: https://trud.bg/над-14-000-е-рецепти-са-били-анулирани/

Фармацевт. (2022). Електронните рецепти – въпроси и отговори [online], Фармацевт.БГ.(Farmatsevt, 2022, Elektronnite retsepti - vaprosi i otgovori, Farmatsevt.BG), available at: https://pharmacist.bg/elektronnite-retsepti-vaprosi-i-otgovori/

Хаджийски, В. (2020). С 18-годишно закъснение държавата въведе електронните рецепти, Dnevnik [online], (Hadzhiyski, V., 2020, S 18-godishno zakusnenie durzhavata vuvede elektronnite retsepti, Dnevnik), available at: https://www.dnevnik.bg/bulgaria/2020/12/18/4154408_s_18-godishno_zakusnenie_durjavata_vuvede_elektronnite/

Цекулова, Н. (2023). Ако не я направим задължителна, никога няма да проработи. Защо електронната рецепта се спъна на старта, Свободна Европа [online], (Tsekulova, N., 2023, Ako ne ya napravim zadulzhitelna, nikoga nyama da proraboti. Zashto elektronnata retsepta se spunna na starta, Svobodna Evropa), available at: https://www.svobodnaevropa.bg/a/elktronna-recepta-falstart/32651975.html

Ankov, C., Vasileva, S. (2025). Economic and Social Impact of Healthcare Reforms in Bulgaria, Econ. Altern. 31, pp. 77-108, https://doi.org/10.37075/EA.2025.1.05.

Deetjen, U. (2016). European E-Prescriptions: Benefits and Success Factors. Cyber Studies Programme, Univ. Ofxford Res. Arch., Working Paper Series 4.

Dimitrova, M., Dimitrov, R., Ahchiyska, K., Nikolaeva, M., Ganova, M., Petrova, G. (2023). Digital health in Bulgaria: Imagination or possible reality? Pharmacia 70, 652, https://doi.org/10.3897/pharmacia.70.e108957.

Džakula, A., Banadinović, M., Lovrenčić, I.L., Vajagić, M., Dimova, A., Rohova, M., Minev, M., Scintee, S.G., Vladescu, C., Farcasanu, D., Robinson, S., Spranger, A., Sagan, A., Rechel, B. (2022). A comparison of health system responses to COVID-19 in Bulgaria, Croatia and Romania in 2020, Health Policy 126, pp. 456-464, https://doi.org/10.1016/j.healthpol.2022.02.003.

Lebanova, H.V., Stoev, S.N., Veleva, N.R., Belcheva, S.P., Madzharov, V.G., Gueorguiev, S.R. (2023). Prevalence of Self-Medication with Antibiotics in Europe: A Scoping Review, J. Biomed. Clin. Res. 16, pp. 5-16, https://doi.org/10.2478/jbcr-2023-0001.

Mitkova, Z., Doneva, M., Gerasimov, N., Tachkov, K., Dimitrova, M., Kamusheva, M., Petrova, G. (2022). Analysis of Healthcare Expenditures in Bulgaria, Healthcare 10, 274, https://doi.org/10.3390/healthcare10020274.

Minev, M. (2019). Assessing Access to Healthcare in Bulgaria, Izv. J. Union Sci. – Varna 8, pp. 144-145.

Nikolova, V., Zlateva, M., Radoslavova, K., Izetova, N. (2023). Impact of the COVID-19 pandemic on antibiotic use in Bulgaria, Scripta Scientifica Salutis Publicae, pp. 34-37, https://doi.org/10.14748/sssp.v8i1.9481.

Eurostat. (2024). Population on 1 January by age and sex 2024, available at: https://ec.europa.eu/eurostat/databrowser/view/demo_pjan/default/table?lang=en

Rautava, P., Forsstrom, J. (2011). Electronic prescriptions are slowly spreading in the European Union, J. Telemed. E-Health 17, 219.

Tomislav, M., et al. (2022). The burden of bacterial antimicrobial resistance in the WHO European region in 2019: a cross-country systematic analysis, Lancet Public Health 7, pp. e897-e913, https://doi.org/10.1016/S2468-2667(22)00225-0.

Zaykova, K., Nikolova, S., Pancheva, R., Serbezova, A. (2022). A survey of knowledge, attitudes and use of antibiotics among Bulgarian population. Biotechnol, Biotechnol. Equip. 36, pp. 933-941, https://doi.org/10.1080/13102818.2022.2145237.

Zaykova, K., Nikolova, S.P., Pancheva, R., Serbezova, A. (2024). Antibiotic Prescribing Practices to Children Among in- and Outpatient Physicians in Bulgaria, Acta Medica Bulgarica 51, pp. 33-40, https://doi.org/10.2478/amb-2024-0075.