Tenth Anniversary of eHealth at the National Institute of Public Health

Živa Rant, Eva Štupica, Jure Janet, Miha Knavs, Lucija Tepej Jočić, Matjaž Malešič, Eva Hafner, Boško Simeunović, Dijana Čančarević, Simon Indihar, Hajdi Kosednar

National Institute of Public Health, Ljubljana, Slovenia
ziva.rant@nijz.si, eva.stupica@nijz.si, jure.janet@nijz.si, miha.knavs@nijz.si, lucija.tepej-jocic@nijz.si, matjaz.malesic@nijz.si, eva.hafner@nijz.si, bosko.simeunovic@nijz.si dijana.cancarevic@nijz.si, simon.indihar@nijz.si, hajdi.kosednar@nijz.si

DOI
https://doi.org/10.18690/um.fov.4.2026.51

ISBN
978-961-299-152-4

In 2015, the National Institute of Public Health of the Republic of Slovenia (NIJZ) assumed responsibility for managing the solutions of eHealth project. Since then, eHealth services have been continuously upgraded and improved. The use has steadily expanded, as has the range of content and functions available to patients and healthcare professionals. Despite the challenges NIJZ faced in introducing innovative solutions at the national level, the services have been successfully implemented. Today, eHealth services play a crucial role in supporting healthcare providers and facilitating electronic access to health records for the entire population. The most significant achievement of the Slovenian eHealth is its full population coverage, making it one of the few such examples worldwide. This paper describes the main characteristics and achievements of the eHealth solutions, including ePrescription, the zVEM patient portal, the zVEM+ healthcare professionals portal, eAppointment, the Central Registry of Patient Data, the eHeath Users Database, Teleradiology and TeleStroke. It also presents data on how these services are used.

Keywords:
National Institute of Public Health of the Republic of Slovenia, Healthcare digitalisation, ePrescription, zVEM patient portal, eAppointment, Central Registry of Patient Data

University of Maribor Press

1 Introduction

The eHealth project began in 2008 and ran until November 2015. It was based on the document eHealth2010 – Strategy for Informatization of the Slovenian Healthcare System 2005–2010 (2005), issued by the Project Unit of the Centre for Healthcare Informatics within the Ministry of Health of the Republic of Slovenia. The eHealth project was one of the largest public service sector digitalisation initiatives in Slovenia. It was led by the Ministry of Health of the Republic of Slovenia and co-financed by the European Social Fund. On 1 December 2015, the National Institute of Public Health of the Republic of Slovenia (NIJZ) assumed responsibility for managing the components of the eHealth system, while the Ministry of Health provided funding for its maintenance and further development. Since then, eHealth services have been continuously upgraded and developed. Use has steadily expanded, as has the range of content and functions available to patients and healthcare professionals. All components of the eHealth system operate at the national level and are used by all healthcare providers in Slovenia. The successful operation of the system is underpinned by two key elements: the Healthcare Databases Act – ZZPPZ (2015) and the Health Insurance Card Number, which provides a unique identifier for patients across all healthcare databases.

Despite the challenges NIJZ faced in introducing innovative solutions at the national level, they have been successfully implemented. Today, these eHealth services play a key role in supporting healthcare providers and enabling the entire population to access their health records electronically. According to the European Commission's Digital Economy and Society Index (DESI) 2024, Slovenia ranks eighth in the EU for access to electronic health records. The overall eHealth maturity score is 88%, compared to the EU Member State average of 79% (European Commission et al., 2024).

In 2017, ePrescription received the Award "Informacijska jagoda" for the best achievement in the field of the information society. In 2022, the zVEM portal received the Award for Current Achievements in the field of information society, and the zVEM mobile app received the "eNagrada" award.

2 Methodology

This paper analyses the functionality and use of the eHealth system to mark the 10th anniversary of eHealth at NIJZ. The research question is What are the eHealth solutions, and how have they evolved and been used over the past ten years?

A literature review of the relevant literature in this field was conducted (Rant & Rant, 2018; Rant, Kosednar, et al., 2025; Rant & Stanimirović, 2019, 2020, 2021, 2024a, 2024b; Rant et al., 2021, 2022a, 2022b; Rant et al., 2017; Rant et al., 2018; Rant et al., 2019; Rant et al., 2025; Stanimirović et al., 2022a, 2022b; Kosednar, 2025; Tepej Jočić, 2024, Janet & Štupica, 2025; Plevnjak & Stanimirović, 2024).

The study applied a case study research methodology (Kljajić Borštnar, 2022; Yin, 2018), which included an in-depth examination and analysis of the field. Project documentation, user guides and technical specifications were reviewed. An observational approach was used for in-depth examination, drawing on the experience and expertise of NIJZ experts responsible for managing the eHealth system. Usage statistics were retrieved from the business and administrative modules of the system and analysed.

The system's functionality and use were analysed between November 2025 and January 2026. Statistics from the business and administrative modules were retrieved and analysed in February 2026.

The observational approach applied in this study has several important limitations that should be explicitly acknowledged. The analysis relies on the direct experience and expertise of NIJZ experts, who are simultaneously system operators and researchers. This dual role may introduce potential bias, including selective interpretation of system performance, positive reporting bias, and limited critical distance from the observed processes. Furthermore, as the observations are not based on independent external evaluation, there is a risk that certain challenges or system limitations may be underreported or interpreted in a more favourable light.

In addition, the absence of a formalised observational protocol and the reliance on internal knowledge may affect the reproducibility and objectivity of the findings. While the approach provides valuable insider insights into system functionality and

development, the results should therefore be interpreted with caution and understood as context-dependent. Future research would benefit from the inclusion of independent evaluators and complementary methodological approaches to mitigate these limitations and strengthen the validity of the findings.

3 Results

3.1 Key solutions of the Slovenian eHealth system

The eHealth system includes twenty interconnected solutions. The most notable solutions are ePrescription, eAppointment, Central Registry of Patient Data, zVEM patient portal and zVEM+ healthcare professionals portal.

3.2 ePrescription

ePrescription was the first eHealth solution to be rolled out at national level. It was introduced at primary level throughout Slovenia in November 2015 and at secondary and tertiary levels in February 2016. It is used daily by healthcare providers and pharmacies and proved particularly important in ensuring patient access to medicines during the COVID-19 pandemic.

ePrescription is a national IT solution for the secure electronic prescription prescribing and dispensing of medicines. Electronic prescriptions (e-prescriptions) are generated in healthcare providers' (HCPs) local information systems and stored in the central electronic prescription record, which provides pharmacies with the information needed to dispense medicines to patients on the basis of e-prescriptions. Patients can access this information via the zVEM patient portal ("zVEM Portal", 2025). The portal displays prescribed medicines, including the prescriber and the date of prescription. It also displays medicine dispensations and how many remain for renewable prescriptions. Patients can collect medicines from the same prescription at different pharmacies across Slovenia.

In the first month of operation (December 2015) 772,217 e-prescriptions were issued and 1275 providers used ePrescription. The total number of prescriptions issued per year increased until 2019 and remained largely unchanged between 2019 and 2021. Since 2022, the total number of prescriptions has increased. In 2024, the

total number exceeded 16,000,000, and the same level was recorded in 2025 (Figure 1). ePrescription was used by 1500 healthcare providers; e-prescriptions were issued in 1092 organisations, and medicines were dispensed by 356 pharmacies.

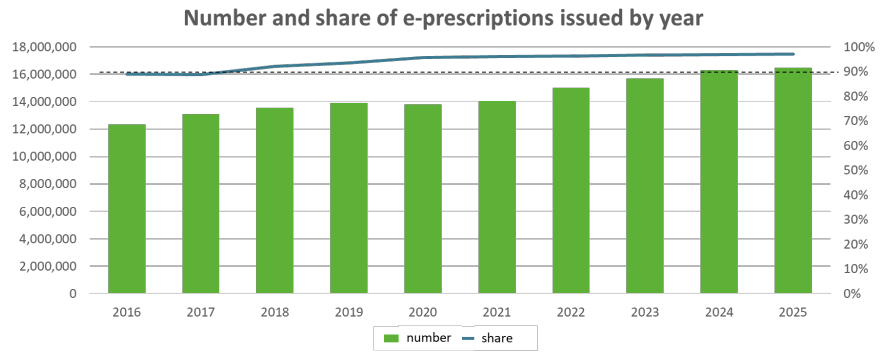

Figure 1: Number and share of e-prescriptions issued by year
Source: Own

The ePrescription objective was to have 90% of prescriptions prescribed electronically. Since 2020, more than 96% of prescriptions have been issued electronically, reaching 97% in 2025. A rate of 100% will never be achieved due to prescribing regulations, as some prescriptions must still be issued on paper, including emergency prescriptions, prescriptions issued during home visits, doctors' prescriptions for their own use, and prescriptions containing narcotic or psychotropic drugs (Rant & Stanimirović, 2024a).

The ePrescription solution represents good practice in the digitalisation of healthcare in Slovenia. During the COVID-19 pandemic, it ensured uninterrupted access to medicines, as doctors could prescribe medicines remotely and patients could collect them at any pharmacy in Slovenia using their health insurance card. This is also reflected in the successful use of this component: more than 97% of prescriptions are issued electronically, placing Slovenia among the global leaders.

In 2024, access to view e-prescriptions was extended to nurses. In 2025, a function was introduced to check medicines for substances prohibited for athletes, based on the List of Prohibited Substances and Methods for Athletes maintained by the Slovenian Anti-Doping Organisation (SLOADO). Further adjustments are planned

to meet new requirements introduced primarily by the Act Amending the Medicines Act (ZZdr-2), the Regulations on Classification, Prescribing and Dispensing of Medicines for Human Use, and the Healthcare Digitalisation Act *(Healthcare Digitalisation Act (ZDigZ)*, 2025).

3.3 zVEM Patient Portal

For patients, the most well-known solution of the system is the zVEM patient portal (the acronym zVEM means "health all in one place"). It provides secure and reliable access to data stored in the eHealth system and the Health Insurance Institute of Slovenia (HIIS) database via a single access point. From the patient's perspective, it represents an important milestone in the history of Slovenian healthcare and one of the most significant advances in recent decades. During the COVID-19 pandemic, it played an important role in informing the public and raising awareness.

The zVEM portal can be accessed using the national SI-PASS authentication service with suitable means of electronic identification, such as a qualified SIGEN-CA digital certificate, the smsPASS mobile identity, a biometric identity card via the eOsebna mobile application, or another type of digital identity. The portal was technically implemented at the completion of the eHealth project in November 2015. Full functionality, including user registration, has been available since the beginning of 2017. The zVEM mobile app was developed to meet the growing needs of users and has been in use since July 2021.

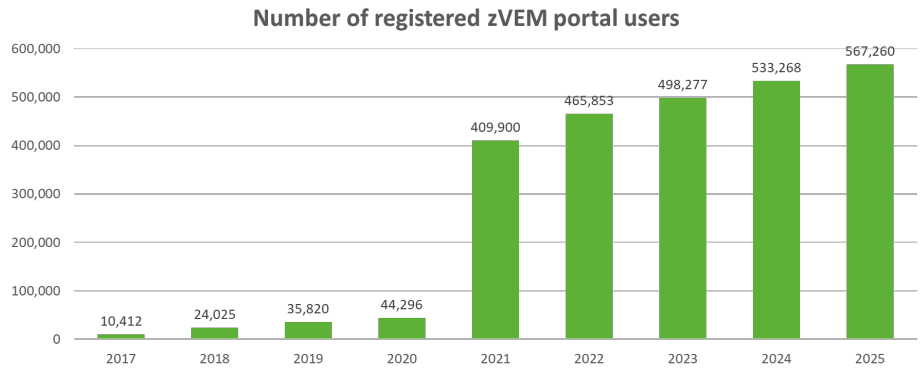

Figure 2: Number of registered zVEM portal users
Source: Own

By the end of 2025, around 570,000 users had registered of whom almost 380,000 used the mobile app. Including linked persons (i.e. children under 15, persons under guardianship and represented persons who authorized another person to access their data), the total number of users is around 740,000. Around 120,000 unique visits are recorded monthly. To facilitate the transition to digital services and assist the elderly in arranging digital identities and authorizations, the Ministry of Health, in cooperation with NIJZ, Ministry of Digital Transformation and Ministry of Public Administration, has established zVEM digi-points throughout Slovenia (*Digitočke za portal zVem*, 2026).

The portal developed significantly during the COVID-19 pandemic. During this period, the zVEM portal was used to establish the national vaccination appointment system, issue digital COVID certificates, and record COVID-19 test results for providers without their own information systems. The faster growth in the number of registered users in 2021 can be attributed to the introduction of the option to print EU Digital COVID Certificate in June 2021 and the launch of the zVEM mobile phone app in July 2021, when the number of users increased more than ninefold (Figure 2).

In 2025, the range of functionalities and available content expanded significantly, particularly as part of the Telehealth and Telemedicine project, funded by the EU through the Recovery and Resilience Plan. Patients can receive notifications via push notifications, emails and SMS. The portal also allows users to enter contact details, which are required for patient notifications and the national rollout of electronic communication with care teams.

The portal also provides access to HIIS content: electronic sick leave certificates (eBOL) and electronic blood donation certificates (ePODK), information on selected personal physicians, compulsory insurance status and insurance history, the costs of medicines and services, medical devices, cash benefits, the validity of the European Health Insurance Card, and A1 certificates.

A patient may authorize a more digitally skilled person to access their health data and perform most services on the zVEM portal, which significantly increases the accessibility of eHealth for vulnerable patient groups (Janet & Štupica, 2025). Another major innovation is the introduction of electronic communication with

healthcare teams through the zVEM portal, enabling patients to communicate with their doctors in a uniform way regardless of which provider within the public healthcare network they belong to.

3.4 National zVEM+ system

The national zVEM+ solution was launched in 2021 and is intended exclusively for professional users, i.e. staff working at healthcare providers. It enables the collection and processing of data, the submission of various reports, and queries based on basic patient demographics. During the COVID-19 pandemic, particularly important functions included the issuance of digital COVID certificates and the entry of COVID-19 test results into the Central Registry of Patient Data (CRPD). It also provides NIJZ, as the system operator, with access to data for public health activities, e.g. such as the continuous collection of mortality data (Rant et al., 2022a).

The Personal Medication Card (PMC) is one of the most widely used zVEM+ features. It is a document prepared by pharmacists in the zVEM+ or pharmacy apps. In doing so, they also use ePrescription data. The document has a standardised format and is intended for patients taking multiple medicines. It contains a list of the patient's medicines and instructions for their use. The PMC is available to patients electronically via the zVEM portal. The PMC has been available since March 2023; our data show a steady increase in the number of PMCs created, indicating that the function is being used increasingly by healthcare providers and patients (Janet & Štupica, 2025).

The zVEM+ portal also supports the Registry of Rare Non-Malignant Diseases (RRNB), managed by the Division of Paediatrics at the University Medical Centre Ljubljana.

Since 2025, zVEM+ has also been used as a communication hub for secure electronic communication between patients and their care teams, and between selected personal physicians and specialists regarding their patients. Through the zVEM portal, patients can contact their general practitioner, dentist, paediatrician or gynaecologist. In the future, communication will also be enabled with other care teams involved in patient care, such as registered nursing teams, community nursing services and specialist teams providing care for referred patients.

The zVEM+ portal includes care team management, which is a prerequisite for introducing targeted communication and other advanced features for team members involved in patient care. It allows the entering of zVEM authorisations in the CRPD.

3.5 eAppointment

eAppointment is a national information system for electronic referrals and appointment scheduling for healthcare services from primary to secondary and tertiary care, as well as within secondary and tertiary care. It is also used to monitor waiting times and waiting lists. The eAppointment system was introduced nationwide in 2016. On 10 April 2017, the Ministry of Health (MoH) placed electronic and paper referrals on an equal footing.

The eAppointment information system comprises three components: referrals, appointment scheduling and waiting lists. In their local information system, the doctor generates an electronic e-referral document (which may be either an e-referral or an e-work order), signs the document electronically and transmits it to the central eAppointment system. Appointments for referred healthcare services are scheduled on the basis of the e-referral document.

The system enables online appointment scheduling. Appointments may be scheduled by the doctor who issued the e-referral, by a nurse, or at the provider's infopoint. Patients can schedule appointments via the zVEM portal, via the eAppointment portal, or with the assistance of a call centre adviser. Patients may still contact the healthcare provider with whom they wish to schedule the selected healthcare service, as was possible before the introduction of eAppointment – by phone, email, regular mail or in person. In such cases, the referring provider (specialist) performing the service schedules the appointment.

The eAppointment system displays waiting lists or the first available appointment slots for many healthcare services, defined in the *Healthcare Service Code List* (*Šifrant vrst zdravstvenih storitev* – VZS). Waiting lists are reported for a defined set of healthcare services. In version 18.1 of the code list, the total number of healthcare service codes (VZS) is 2541. Waiting list monitoring is available for 1857 VZS. Patients can schedule appointments online themselves for 669 active (valid) VZS. Healthcare providers are responsible for reporting accurate data of available slots

and appointments. The central system displays the data reported by individual healthcare providers.

Each month, more than 400,000 e-referrals are issued and more than 700,000 e-appointments are scheduled. Since the introduction of eAppointment, more than 37 million e-referrals have been issued, more than 1200 healthcare providers deliver at least one service through the system.

Following the decline in 2020 and 2021, the number of issued e-referrals has increased again, exceeding 4 million per year. Since 2020, e-referrals have accounted for at least 95% of all referrals. In 2025, 97% of referrals were issued electronically (Figure 3).

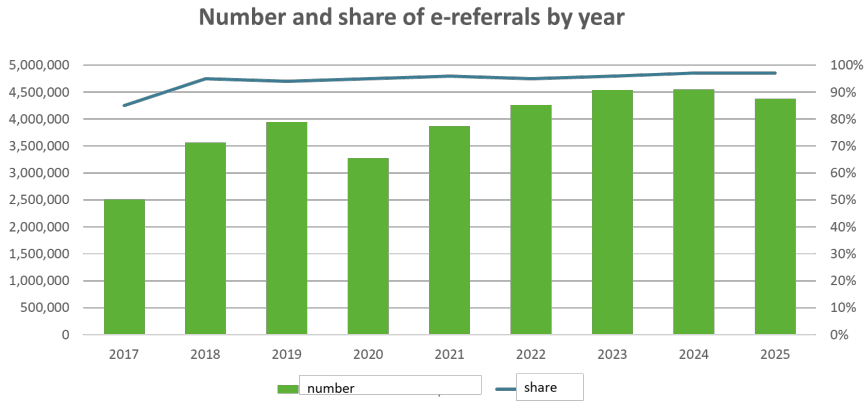

Figure 3: Number and share of e-referrals by year
Source: Own

Since August 2024, referrals have been valid until the completion of treatment, meaning that patients no longer need additional referral documents for diagnostics, follow-up examinations or procedures related to the same medical condition and type of healthcare service.

Push notifications in the zVEM mobile app allow patients to receive notifications from eAppointment about issued referral documents and their scheduled appointments. In this way, patients are informed in a timely manner about their

specialist appointments, which reduces missed appointments and raises awareness of patients' responsibilities.

The Rules on Appointment Scheduling and Management of Waiting Lists and Maximum Permissible Waiting Times (2024) introduce a new definition of a patient waiting beyond the maximum permissible waiting time (Kosednar, 2024). As a result, the methodology for calculating patients waiting beyond the maximum permissible waiting time had to be revised and implemented in the eAppointment system.

Since 1 September 2025, the eAppointment system has enabled the issuing and receipt of electronic work orders for physiotherapy. The gradual introduction of e-work orders for other services (for example community nursing and others) is also planned. With the physiotherapy e-work order, patients can schedule appointments with a physiotherapist online. First available slots for physiotherapy services are reported, and a national waiting list for patients has also been established.

Data from the first months after its introduction indicate an increase in the use of e-work orders. In September 2025, approximately 18,500 physiotherapy e-work orders were issued, rising to around 25,000 per month by January 2026. This trend shows a gradual transition to the electronic version and increasing integration of healthcare providers into the national appointment reporting system.

The eConsultation service has also been implemented as part of the eAppointment system. It enables electronic communication between healthcare professionals, specifically between a general practitioner and a specialist, allowing the general practitioner to obtain the specialist's opinion on a clinical question. The eConsultation service is available for all types of healthcare services.

3.6 Central Registry of Patient Data (CRPD)

The Central Registry of Patient Data is a unified system for collecting and exchanging health data on patients receiving healthcare in the Republic of Slovenia. The purpose of the CRPD is to enable the electronic exchange of health data between healthcare providers so that the data are available during patient care.

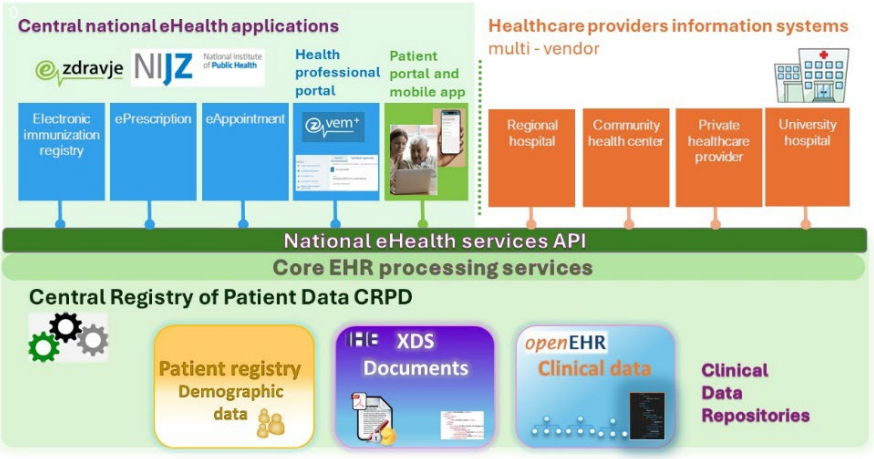

Figure 4: Core components of the CRPD
Source: Own

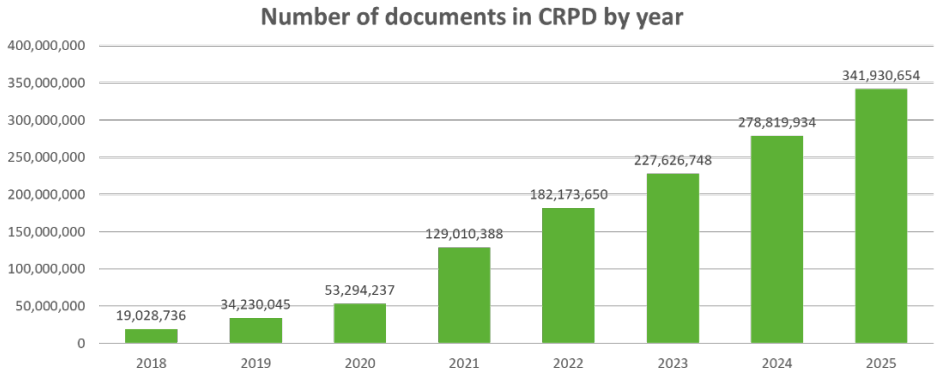

Figure 5: Number of documents in CRPD by year
Source: Own

The CRPD comprises three core system components (Figure 4). The Registry on Patient Demographics and Status data contains basic personal information such as name, surname, address, and health insurance details (Tepej Jočić, 2024). The document system contains electronic health records (e.g. pdf or xml documents). The clinical database contains structured health records in a format suitable for access and reuse. Access to the CRPD is restricted by technical mechanisms defined on the Rules on access to CRPD 2025). Healthcare providers access the CRPD

through their local health information systems or via the zVEM+ online portal. The CRPD data are made available to patients via the zVEM portal.

Under applicable legislation, all healthcare providers are required to submit data to the CRPD. Records are entered on a rolling basis. Approximately 200,000 new health records are entered into the CRPD each day, amount to approximately 5 million per month. From its launch until 31 December 2025, more than 330 million documents were available in the CRPD (Figure 5).

In 2023, the CRPD underwent a technological overhaul enabling the further development of advanced digital services. Significant functional expansions are expected through the "National EHR and unified data model" project, implemented under the Recovery and Resilience Facility (RRF).

3.7 eHealth Users Database (EueZ – security scheme)

The eHealth Users Database (EueZ) is the central authentication and authorisation service for the eHealth system components. Currently, eHealth system components are connected to the EueZ, and the components being developed within the RRP will soon also be integrated.

Almost 575,000 zVEM portal users have a profile in EueZ. The total number of EueZ users exceeds 590,000, including more than 2900 registered active healthcare providers.

Users' profiles contain the permissions and roles assigned to them within the organisations where they are employed. Most roles and permissions are assigned automatically based on rules derived from data on education and employment data recorded in the Register of Healthcare Providers and Healthcare Professionals (RIZDDZ), or from permissions defined on the HIIS professional card. Roles can also be assigned manually.

3.8 Teleradiology and TeleStroke

The two solutions are interconnected, as TeleStroke uses Teleradiology to transmit radiological images.

Teleradiology is used to transmit radiological images between HCPs. The system has been in place since the start of the eHealth programme and has evolved rapidly in terms of the number of transmissions and connected organisations. Most HCPs with a digital radiology image archive (PACS) connect it to the system. If not, they use Tele PACS to view and transmit images via Tele Portal. The number of monthly transmissions is currently approaching 16,000 (Figure 6). More than 70 organisations are already connected: two sevenths are hospitals, two sevenths health centres and three sevenths private HCPs.

The TeleStroke solution enables remote stroke management from the Division of Neurology in Ljubljana when a patient is treated in one of Slovenia's general hospitals without an on-call vascular neurologist. More than 1200 such cases are recorded each year. The patient is assessed using a web application; a standard questionnaire is completed, CT and/or MRI scans of the head are available for transmissions and viewing, and a report is prepared at the end of the procedure. Audiovisual patient management is also possible by means of diagnostic trolleys available in hospitals.

3.9 The empirical assessments of the adoption of eHealth services and qualitative data on user satisfaction

Kodermac and Peršolja (Kodermac & Peršolja, 2024) in their research about patient satisfaction with the eHealth system in Slovenia found that respondents were generally satisfied with the eHealth services (M = 4,18). Their satisfaction decreases only slightly with age. 62,1 % of respondents were satisfied or very satisfied with ePrescription, 62,4 % with eAppointment and 48 % with zVEM Patient Portal . Data from the Statistical Office of the Republic of Slovenia for the first quarter of 2025 show that 92% of individuals aged 16 to 74 use the internet, 27% of whom use it to access their own health records, while only 62% of the elderly (aged 65 to 74) use the internet several times a day. Among the 6% of those who have not yet used the internet, the elderly predominate (Statistical Office of the Republic of Slovenia, 2025).

4 Discussion

During the ten years of management by the NIJZ, the eHealth systems have made significant functional, organisational and user-related progress. The analysis shows that the system has gradually evolved from a project into a stable national infrastructure supporting data exchange, public health activities and patient involvement managing their own health. A notable acceleration in development was seen during the COVID-19 pandemic, when digital systems proved to be a key mechanism for ensuring continuity of care.

The greatest progress has been observed with the zVEM and zVEM+ portals. The development of new functionalities and the integration of HIIS content have enabled the zVEM patient portal to become a single-entry point for eHealth services and to significantly improve the transparency of health data. During the pandemic, it enabled users to view digital COVID certificates, test results and vaccination data. The surge in registered users in 2021 confirms that the system was capable of responding effectively to emergencies. At the same time, the zVEM+ portal enabled the real-time entry of vaccination and testing data into the CRPD, ensuring up-to-date data and supporting epidemiological surveillance. With the introduction of zVEM authorisations, the Slovenian eHealth system now fully meets the requirements of the European Health Data Space Regulation (EHDS) for the establishment of proxy services. In the future, zVEM+ will also serve as the main access environment for the National EHR and unified data model project, further strengthening its strategic role.

The ePrescription solution is also an important component of the digital transformation. During the pandemic, the use of remote electronic prescribing significantly improved patients' timely access to the medicines they needed. During the pandemic, remote prescribing significantly improved access to treatment, particularly for patients with chronic conditions and other vulnerable groups. The stable share of more than 97% of prescriptions issued electronically confirms a high level of acceptance among healthcare professionals and patients, as well as the system's organisational maturity. The successful implementation of the ePrescription system has also raised expectations regarding cross-border data exchange, highlighting the need for legal harmonisation, technical interoperability and standardisation of data models. Pilot data exchange with Croatia already

indicates the potential for Slovenia's broader integration into the European Health Data Space.

CRPD serves as the central data backbone of the eHealth system. The exponential growth in the number of documents and structured records confirm its key role in providing a comprehensive view of patients' medical records. Centralised access to data significantly contributes to the safety and quality of care, as it enables more informed clinical decision-making. At the same time, the growing volume of data raises questions about long-term architecture, infrastructure capacity, semantic interoperability, and secondary use of data for research and public health purposes.

The TeleStroke and Teleradiology systems demonstrate the important role of digital technologies in ensuring equitable access to specialist care across the country. TeleStroke directly affects stroke treatment outcomes, where time is a critical factor, while Teleradiology enables more efficient use of human and technical resources. Both systems demonstrate that digitalisation is not merely an administrative tool, but can directly influence clinical outcomes.

The eAppointment system has significantly improved the transparency of waiting times and the standardisation of waiting lists. The centralised display of first available appointments and the high share of electronically issued referrals indicate that the system is firmly established. However, ensuring the quality and timeliness of data remains a challenge, as the accuracy of reporting depends on healthcare providers. Changes in legislation and in the methodology for calculating patients waiting beyond permissible time limits required adjustments to the system, highlighting the need for a flexible architecture that enables the rapid implementation of regulatory changes.

A high level of personal data protection and security is essential for maintaining users' trust, particularly as the volume of digital communication and the exchange of sensitive health data continues to grow. Accordingly, cybersecurity and data protection are among the core principles of Slovenian eHealth. Several layers of security are ensured. All healthcare providers are connected to the secure communication network zNET. End users can only access the services by means of electronic identification. The eHealth Users Database provides centralised management of authentication and authorisation and ensures that the credentials of

health professionals are aligned with their actual employment and qualifications. Moreover, filtering of accessible content is implemented within eHealth applications. For example, access to CRPD is only granted to the patient's selected personal physician and the members of their care team. Moreover, the available content is filtered depending on the medical speciality (practice setting) so that the access to the most sensitive records (e.g. mental health records) is rigorously restricted (Tepej Jočić, 2021). Balancing data protection and accessibility is one of the greatest challenges of Slovenian eHealth. On the one hand, data availability is critical for patient safety and quality of care. On the other hand, nationwide access to EHR is often questioned in terms of privacy. The Slovenian eHealth system has embedded privacy by design. However, the governance of such a complex system is challenging and resource-consuming, and a vast proportion of issues and complaints are related to limited accessibility of personal data.

Despite these notable achievements, important challenges still remain. These include the need for additional investments in infrastructure, interoperability with European initiatives (e.g. the European Health Data Space), strengthening the digital competences of healthcare professionals and patients, and developing analytical tools for the secondary use of data. Although users' digital literacy has improved, it remains uneven, which may lead to inequalities in access to digital services.

In conclusion, the eHealth system in Slovenia has progressed from the implementation phase to a phase of system consolidation and further development. The COVID-19 pandemic acted as a catalyst for digital transformation, while future developments will largely depend on the successful implementation of projects under the Recovery and Resilience Plan and on the adoption of the Healthcare Digitalisation Act.

5 Conclusion

During the period of management by the NIJZ, the eHealth system in Slovenia progressed from the development and implementation phase to a phase of system stabilisation, expanded functionality and high user acceptance. Over the past ten years, it has become the core digital infrastructure of the Slovenian healthcare system, supporting data sharing, administrative processes, public health monitoring and, increasingly, active patient participation.

The analysis showed that one of the key turning points was the COVID-19 pandemic, which accelerated the use of already established systems (ePrescription, CRPD, eAppointment), and significantly increased the visibility and uptake of the zVEM portal and the zVEM+ system. Digital services have enabled continuity of care, secure data exchange, and rapid adaptation to emergency situations. This confirmed the strategic soundness of establishing nationally centralised systems based on a unified architecture and security framework.

A major achievement of the Slovenian eHealth system is the near-complete digitalisation of key processes (prescription issuing, referral issuing, electronic appointment scheduling), as well as the high level of population coverage. Today, the Central Registry of Patient Data is one of the largest national health data resources, opening significant opportunities for the development of analytics, research and data-driven decision-making in healthcare. At the same time, such a volume of data requires continued investments in security, interoperability, standardisation and the long-term sustainability of the infrastructure.

Despite the progress made, systemic challenges remain. These include ensuring adequate human and financial resources for further development, improving users' digital competences, reducing the digital divide among different population groups, and ensuring the quality and timeliness of data transmitted to central systems by healthcare providers. Particular attention will also need to be paid to alignment with European initiatives on cross-border health data exchange and the European Health Data Space.

Future development will be significantly shaped by the outcomes of projects under the Recovery and Resilience Plan and by the implementation of the Healthcare Digitalisation Act. Further development of systems such as National EHR, expanded electronic communication between patients and healthcare teams, and the wider use of electronic work orders will further strengthen the digital transformation of the Slovenian healthcare system.

It can be concluded that the eHealth system is indispensable for the functioning if the Slovenian healthcare system can no longer be imagined without the eHealth system. It is no longer just a supporting information tool, but a strategic

infrastructure that contributes to greater accessibility, safety, efficiency and quality of care, while strengthening the role of patients within the healthcare system.

References

Digitočke za portal zVem. (6 February 2026) NIJZ. https://nijz.si/obmocna-enota-koper/digitocke-za-portal-zvem

Drev, M., Tepej Jočić, L., & Kosednar, H. (2025). Nadzor nad obdelavo zdravstvenih podatkov = Oversight of health data processing. 579–584. https://nijz.si/wp-content/uploads/2025/09/Zbornik_Javno-zdravje-Most_2025.pdf

e-Zdravje2010 – Strategija informatizacije slovenskega zdravstvenega sistema 2005–2010 (2005). https://interoperable-europe.ec.europa.eu/sites/default/files/document/2014-12/e-Zdravje2010%20-%20Strategija%20informatizacije%20slovenskega%20zdravstvenega%20sistema%202005-2010.pdf

European Commission, Directorate-General for Communications Networks, C. a. T., & Invent, C. (2024). 2024 digital decade ehealth indicator study – Annex – Country factsheets. Publications Office of the European Union. https://doi.org/10.2759/276133

Janet, J., & Štupica, E. (2025). Pregled razvoja rešitev zVEM in zVEMplus ter predstavitev novosti. Overview of the development of zVEM and zVEMplus solutions and presentation of new features. 609–616.

Kljajić Borštnar, M. (2022). Znanstveno proučevanje družboslovnih pojavov.

Kodermac, N., & Peršolja, M. (2024). Zadovoljstvo pacientov z informacijskim sistemom eZdravje v splošni bolnišnici: presečna raziskava. Obzornik zdravstvene nege, In Press. https://doi.org/10.14528/snr.2024.58.4.3266

Kosednar, H. (2024). Dobrodošle nove možnosti eNaročanja. Digitalna preobrazba za dostopno, varno in kakovostno zdravstveno oskrbo: kongres MI'2024.

Kosednar, H. (2025). Vpliv projektov za digitalizacijo zdravstva iz Načrta za okrevanje in odpornost na javno zdravje v Sloveniji = The impact of healthcare digitalization projects from the recovery and resilience plan on public health in Slovenia. 617–624. https://nijz.si/wp-content/uploads/2025/09/Zbornik_Javno-zdravje-Most_2025.pdf

Plevnjak, N., Stanimirović, D. (2024). eNaročanje : pregled dosedanjih ugotovitev o delovanju informacijske rešitve in nadaljnji razvojni koraki. NOVIS: Novice, obvestila, vesti, informacije združenja: Glasilo Združenja zdravstvenih zavodov Slovenije, ISSN 1580-4917, 2024, letn. 51, št. 5/6, str. 38-41. https://www.zdrzz.si/Novis_1/

Portal zVEM. (2025). In.

Pravilnik o pooblastilih za obdelavo podatkov v Centralnem registru podatkov o pacientih. Uradni list RS, št. 51/16, 95/21 in 35/24; https://pisrs.si/pregledPredpisa?id=PRAV15410

Rant, m. Ž., & Rant, Ž. (2018). Projekt e-zdravje v Sloveniji - vsebinski in zgodovinski pregled. In Š. Adamič (Ed.), 30 let Slovenskega društva za medicinsko informatiko (pp. Str. 180-183). Slovensko društvo za medicinsko informatiko.

Rant, Ž., Čančarević, D., & Kosednar, H. (2025). Deset let eRecepta v Sloveniji = Ten years of ePrescription in Slovenia Javno zdravje – most do boljšega zdravja in odpornosti v skupnosti: NKJZ, https://nijz.si/wp-content/uploads/2025/09/Zbornik_Javno-zdravje-Most_2025.pdf

Rant, Ž., Kosednar, H., & Stanimirović, D. (2025). Novosti v nacionalni rešitvi eNaročanje. Human Being, Artificial Intelligence and Organization, Conference Proceedings, 785-796. https://doi.org/10.18690/UM.FOV.2.2025.60

Rant, Ž., & Stanimirović, D. (2019). Analysis of eHealth Solutions in Slovenia: A Usage Perspective. In.

Rant, Ž., & Stanimirović, D. (2020). Analiza uporabe rešitev e zdravja v Sloveniji : izzivi in prihodnje usmeritve. In 39th International Conference on Organizational Science Development (pp. 645-661). Maribor: University Press.

Rant, Ž., & Stanimirović, D. (2021). Presečna analiza uspešnosti in učinkovitosti rešitev eZdravja po petletnem obdobju : uspešnost in učinkovitost eZdravja. NOVIS : novice, obvestila, vesti, informacije združenja : glasilo Združenja zdravstvenih zavodov Slovenije. ISSN 1580-4917. - Letn. 48, Št. 1/2 (2021), 48(1/2), 23-25.

Rant, Ž., & Stanimirović, D. (2024a). Analiza razvojnih in uporabniških vidikov eRecepta v Sloveniji. Green and Digital Transition - Challenge or Opportunity : conference proceedings, 877-886. https://doi.org/10.18690/um.fov.3.2024.63

Rant, Ž., & Stanimirović, D. (2024b). Rešitev eRecept; Elektronski vir : pogled skozi prizmo koristi za pacienta in dodane vrednosti za zdravstveni sistem; The ePrescription solution : a view through the prism of benefits for the patient and added value for the healthcare system :: COBISS Plus. zbornik recenziranih prispevkov in povzetkov : 2. nacionalna konferenca javnega zdravja.

Rant, Ž., Stanimirović, D., & Janet, J. (2021). Novosti pri portalu za paciente zVEM in Centralnem registru podatkov o pacientu. In Spodbujeni s pandemijo v digitalno preobrazbo zdravstva : strokovno srečanje MI'2021 : v Termah Zreče in na daljavo, 4. in 5. november 2021 : zbornik povzetkov. - (pp. 23-23). Ljubljana: SDMI.

Rant, Ž., Stanimirović, D., & Janet, J. (2022a). FUNCTIONALITIES AND USE OF THE ZVEM PATIENT PORTAL AND THE CENTRAL REGISTRY OF PATIENT DATA. 35th Bled eConference: Digital Restructuring and Human (Re)action, BLED 2022 - Proceedings, 65-79. https://doi.org/10.18690/UM.FOV.4.2022.4

Rant, Ž., Stanimirović, D., & Janet, J. (2022b). Razvoj portala zVEM in Centralnega registra podatkov o pacientu. 41th International Conference on Organizational Science Development : society's challenges for organizational opportunities, 873-884. https://doi.org/10.18690/UM.FOV.3.2022.63

Rant, Ž., Stanimirović, D., Matetić, V., Indihar, S., Zidarn, J., Beštek, M.,…Živa Rant, D. S. V. M. S. I. J. Z. M. B. L. T.-J. A. Ž. (2017). eZdravje danes. Uporabna informatika, 25(3), str. 169-179.

Rant, Ž., Stanimirović, D., Tepej Jočić, L., Žlender, A., Gaspari, I., Božič, D.,…Zidarn, J. (2018). Rešitve e-Zdravja. In Š. Adamič (Ed.), 30 let Slovenskega društva za medicinsko informatiko (pp. Str. 184-190). Slovensko društvo za medicinsko informatiko.

Rant, Ž., Stanimirović, D., & Žlender, A. (2019). Nacionalni Portal zVEM v okviru eZdravja = National portal zVEM within eHealth. In Ekosistem organizacij v dobi digitalizacije (pp. Str. 873-884). Maribor: Univerzitetna založba Univerze.

Stanimirović, D., Drev, M., & Rant, Ž. (2022a). Digital Transformation as One of the Instruments for Overcoming the Public Health Crisis: The Role and Use of Ehealth Solutions during the Covid-19 Pandemic in Slovenia. Medicine, Law & Society, 15(1), 169-192. https://doi.org/10.18690/MLS.15.1.169-192.2022

Stanimirović, D., Drev, M., & Rant, Ž. (2022b). Ekspanzija digitalnih rešitev eZdravja v času pandemije covida-19 v Sloveniji. Isis, 31(6), 34-37.

Statistical Office of the Republic of Slovenia. (2025). Usage of internet in households and by individuals, 2025. Stat.si. https://www.stat.si/StatWeb/en/News/Index/13908

Tepej Jočić, L. (2021). *Impact of data protection regulation on Slovenian eHealth. Journal of Global Health, 11*, 03063. https://doi.org/10.7189/jogh.11.03063

Tepej Jočić, L. (2024). Vloga demografskih podatkov pri informatizaciji javnozdravstvene dejavnosti. *ISIS: Glasilo Zdravniške zbornice Slovenije, 2024*(3), 30–34.

Yin, R. K. (2018). Case study research and applications : design and methods (6th ed.). Sage.

Zakon o digitalizaciji zdravstva (ZDigZ). (2025). Uradni list

Zakon o zbirkah podatkov s področja zdravstvenega varstva (ZZPPZ). (2015). In. https://pisrs.si/pregledPredpisa?id=ZAKO1419