▶ Analysis of e-Health solutions in Slovenia: A usage perspective

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Izvleček

Projekt eZdravje v Sloveniji združuje več različnih informacijskih sistemov in zagotavlja pomembne zdravstvene, ekonomske in administrativne podatke, ki lahko pomembno prispevajo k na podatkih temelječem odločanju v zdravstvu. Prispevek prikazuje trenutno stanje najpomembnejših rešitev eZdravja v Sloveniji: eRecepta, eNaročanja in Centralnega registra podatkov o pacientih. Osredotoča se predvsem na različne vidike njihove uporabe med zdravstvenimi delavci in pacienti. Prispevek predstavlja poglobljeno analizo funkcionalnosti in uporabe rešitev eZdravja. Analiza je bila izvedena na eni strani na podlagi pregleda projektne dokumentacije in tehničnih specifikacij in po drugi strani na podlagi izkušenj ter strokovnega mnenja strokovnjakov na NIJZ, ki upravljajo z rešitvami eZdravja in dejanskih statističnih podatkov o uporabi iz administratorskega modula rešitev. Raziskava je pokazala velik napredek v zadnjih treh letih in kratkoročni cilji projekta eZdravje so bili skorajda doseženi brez izjeme. Za izkoriščanje potencialov rešitev eZdravja tudi v prihodnje je potrebna sistemska podpora na vseh ravneh in vseh vključenih deležnikov.

Ključne besede: eZdravje, eRecept, eNaročanje, Centralni register podatkov o pacientu, Povzetek podatkov o pacientu, portal zVEM

Abstract

The project for the digitalization of Slovenian health care (eHealth) should integrate all fragmented information systems and provide relevant medical, economic and administrative data, which could improve the increasingly important evidence-based decision-making and management in the health care system. This paper explores the current state of the most important eHealth solutions in Slovenia, i.e. ePrescription, eAppointment and Central Registry of Patient Data, and furthermore specifically focuses on different aspects of their use by health care professionals and patients. The in-depth analysis included the review of eHealth-related sources and structured discussions with the experts responsible for the development and implementation of eHealth solutions. The research reveals that significant progress has been made in the last 3 years and that the short-term objectives of eHealth solutions have been met almost without exception. However, in order to further exploit the potentials of eHealth in the future, all efforts behind this project will have to be supported by systematic measures on all levels as well as the firm commitment of stakeholders.

Keywords: eHealth, ePrescription, eAppointment, Central Registry of Patient Data, Patient Summary Record, patient portal zVEM

1 INTRODUCTION

The project for digitalization of the Slovenian health care system (eHealth) was managed by the Ministry of Health of the Republic of Slovenia from 2008 to November 2015. It was one of the largest national information and communication technology (ICT) projects in the Slovenian history and was co-financed by the EU through the European Social Fund (Rant et al., 2017).

Strategic goals of the project were especially focused on (MZ, 2010):

- Increasing the active role and responsibilities of citizens for their health.
- Improved access to all necessary health information and ability of citizens to participate in the development of high quality health care services.
- Providing secure and reliable access to all key patient information for all health care providers, ge-

neral practitioners (GPs), specialists, pharmacists within Electronic Health Record (EHR) and other data sets.

- Easier planning and management within health care organizations or health care sector in general, based on the reliable and relevant economic, administrative and clinical data.

- Improved access to health care services for under-privileged groups, which tend to be excluded due to their reduced abilities, age or any other reason. National Institute of Public Health (NIJZ) has taken over the governance of the eHealth project solutions on 1 December 2015. As part of eHealth, NIJZ has taken over the governance of 20 eHealth solutions, i.e. ePrescription, eAppointment, Central register of patient data (CRPD), etc. NIJZ has been facing different challenges, while trying to introduce the eHealth solutions into the health care environment. However, the general success in the implementation of innovative eHealth solutions in Slovenia was recognized by the European Commission. Namely, Digital Economy and Society Index Report placed Slovenia on the sixth place in eHealth Services for 2017(European Commission, 2019b).

Concerning the efforts in Slovenia focused on the implementation of eHealth solutions, two facts should be stressed out: First, all eHealth solutions in Slovenia are implemented on the national level; second, all people living in Slovenia have a health insurance card. It is an official identity document of persons insured, issued by the Health Insurance Institute of Slovenia (ZZZS). The health insurance card also represents an official patient identifier for the use of eHealth solutions in Slovenia.

This paper presents the most popular eHealth solutions and state of their deployment including core indicators.

2 METHODS

In this paper, we analyzed the Slovenian eHealth solutions from the usage aspect. After an exhaustive examination of the literature, project documentations and exploration of other sources in the international eHealth domain, the current situation in Slovenia concerning this topic was thoroughly analyzed. In the next phase of the research, experts from the NIJZ being in charge of eHealth development and implementation, joined the study and provided their inputs and insights concerning the usage of individual eHealth solutions and related issues. Research findings arising from their experience and expertise have been crucial for the overall credibility and reliability of the research results. Their views were supported by the factual usage data extracted from the business intelligence (BI) modules contained in the individual eHealth solutions. The desktop research and in–depth analysis, including the participating experts affiliated with the NIJZ, were conducted from September 2018 to January 2019. The research on usage aspects was predominantly focused on the most popular eHealth solutions in Slovenia: ePrescription, eAppointment and CRPD.

3 RESULTS AND DISCUSSION

In this section we present some facts about the national eHealth solutions ePrescription, eAppointment and CRPD, and outline the findings concerning the different parameters of their usage (Rant et al., 2018; Rant & Stanimirović, 2019).

3.1 ePrescription

ePrescription is the national eHealth solution established for the electronic prescription and dispensing of medications. Despite some difficulties in the early stages, ePrescription now represents a good practice case and can be regarded as one of the most successful and useful eHealth solutions, developed in Slovenia (Stanimirović & Savic, 2018; Stanimirović, Zidarn, Rant, & Matetić, 2018). ePrescription was fully implemented on the national level in 2016 and is daily used at almost all health care providers and pharmacies. The use of e-prescription is almost ubiquitous (it is used by 98 % of general practitioners) and Slovenia ranks 3rd among EU Member States in usage of electronic prescriptions in 2018 (European Commission, 2019a).

Physician (GP or medical specialist) creates ePrescription in his local information system (IS) and sends it to the central database. In order to provide a secure prescribing process, both physician and a pharmacist can access to patient medication history and drug interactions database. The digitally signed document is stored in the central database. Pharmacist retrieves ePrescription and dispenses medications to the patients in the pharmacy. Patients can access to ePrescriptions data via Patient portal zVEM and see full history of prescribed and dispensed medications.

Further below are presented analyses from the ePrescription BI module. Usage of ePrescriptions has been slightly rising in the last 3 years, from 12.326.845 in 2016 through 13.095.808 in 2017 to 13.867.192 in 2018 (see Figure 1). The share of ePrescriptions in total of all prescriptions also rises steadily.
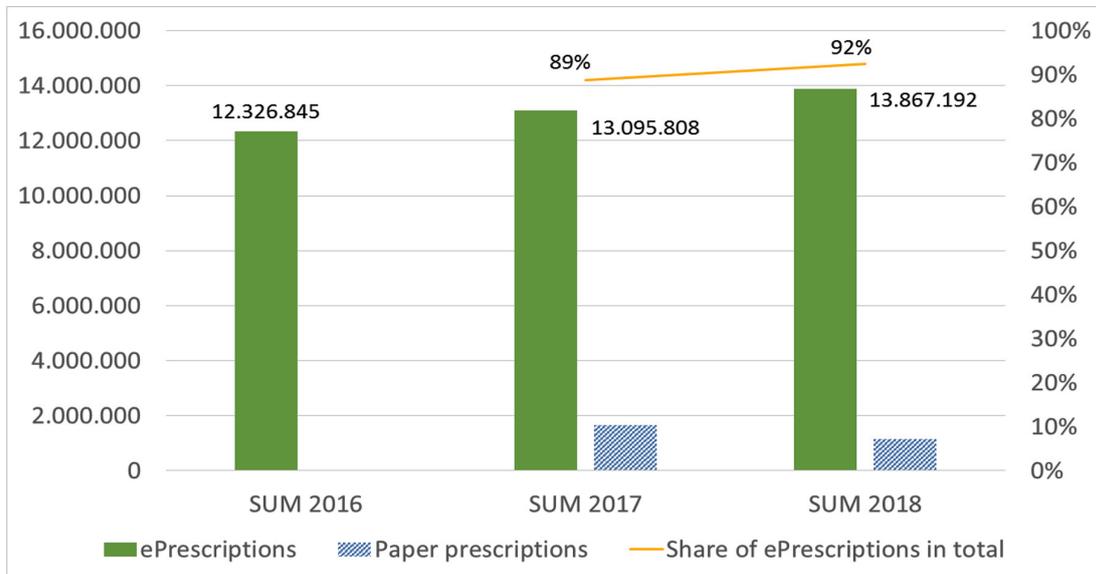

Figure 1: **Number of ePrescriptions per years**

The number of ePrescription varies through seasons; the lowest values are in the summer months (in 2017 and 2018 in August, in 2016 in July), the highest in winter months (except December).
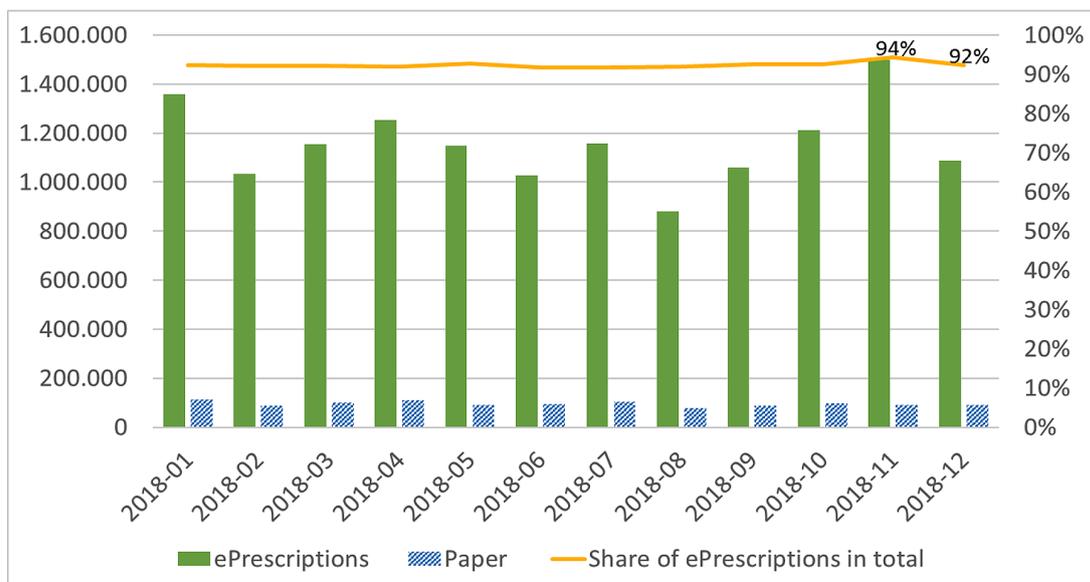

Figure 2: **Number of ePrescriptions in 2018**

The share of ePrescriptions in total of all prescriptions was practically on the same level in 2018: between 92 % and 94 %. Since certain methods of prescribing are not provided through ePrescription (urgent prescriptions, prescribing at home vists, etc.), reaching 100 % of all issued prescriptions will not be possible in short-term (Figure 2). The goal from the year 2016, presuming that the share of ePrescriptions would reach 90 % was achieved and its share is even higher at the moment.

3.2 eAppointment

eAppointment is the national eHealth solution, established for the eReferrals, on-line booking of appointments and waiting lists (Stanimirović & Indihar, 2016). eAppointment was gradually implemented in 2016, and it has been used on the national level since April 2017. The process of issuing eReferrals is similar to that of ePrescription. Physician creates eReferral in his local IS. The digitally signed document is stored in the central database.

The on-line booking of appointments for the particular health care service can be carried out using this eReferral. The whole process can be executed by the patient himself through the Patient portal zVEM, or by a nurse or a physician. The central waiting list is made automatically based on data, retrieved from the local ISs at the health care providers.

eConsultation module was added to eAppointment in 2018. This particular module enables consultation between general practitioners and medical specialists about the concrete patients with the aim to reduce waiting periods and expedite treatment process.

3.2.1 eReferrals

In Figure 3 we can see that the number of eReferrals has been rising in the recent years. The usage of eReferrals rose rapidly in 2017, because on 10 April 2017 eReferral became an official document with the same validity as its paper version (Figure 3).
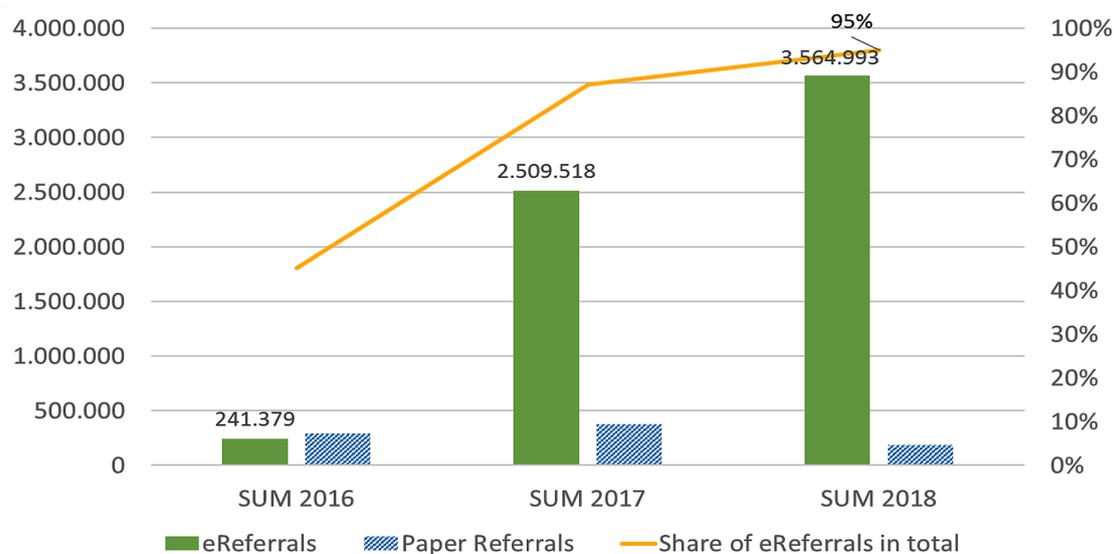

Figure 3: **Number of eReferrals per years**

The number of eReferrals varies through seasons as well; the lowest values are in the summer months, the highest in winter months.

The share of eReferrals in the total of all referrals was more than 90 % in 2018, i.e. between 93 % and 97 % (Figure 4).

3.2.2 On-line booking of appointments

The number of on-line booking of appointments has been rising quickly through the last years, from 324.092 in 2016 to 5.127.599 in 2018 (see Figure 5).
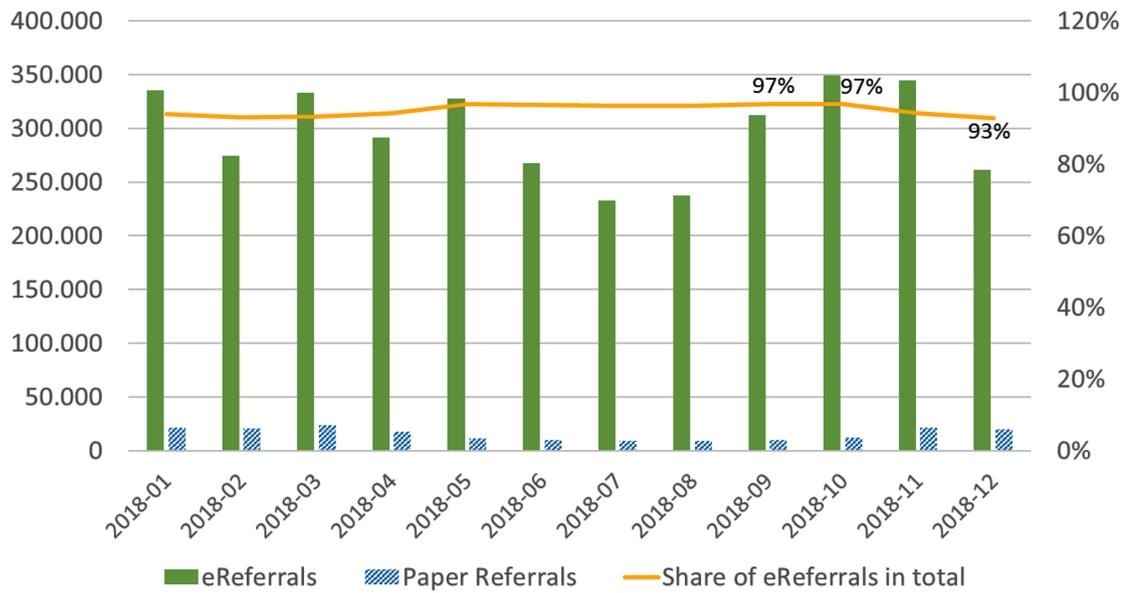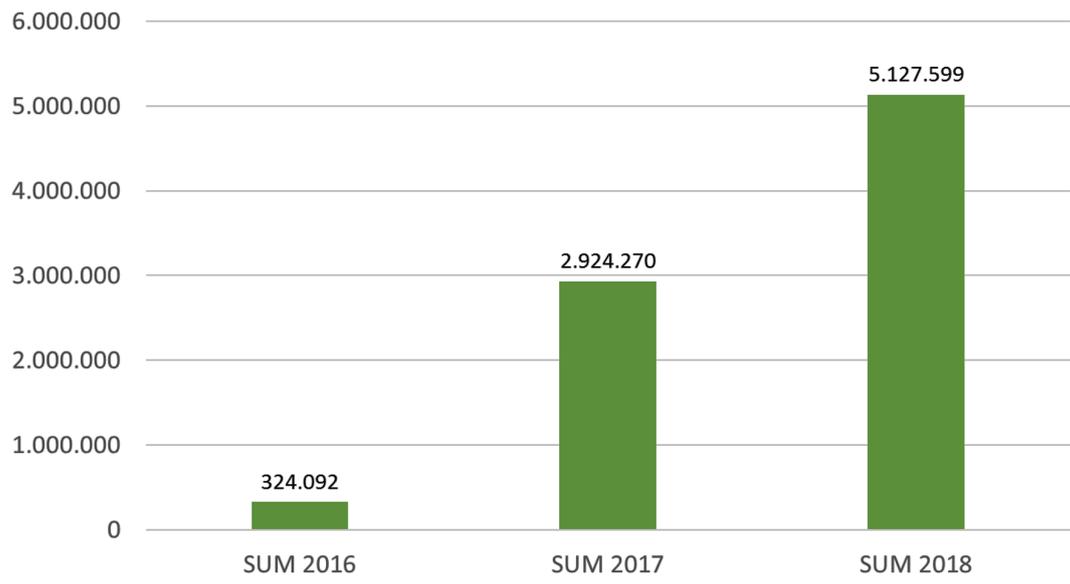
Figure 4: **Number of eReferrals in 2018**

Figure 5: **Number of on-line booking of appointments per years**

The data for waiting lists is generated automatically in the eAppointment BI module using the reported data from the local ISs at the health care providers. However, some waiting list data is still not consistent, since particular process issues at health care providers have still not been adequately addressed, and thus some data are not correct and reliable. NIJZ and other stakeholders in the field are engaged in the task of providing more dependable and exact data, since this is very important information for the patients and health care policy makers. NIJZ intensively promotes the usage of the on-line booking system, which is supported by the HelpDesk, where trained professionals help patients to execute an on--line booking of appointments with the specialists.

3.3 Central Registry of Patient (CRPD)

CRPD is a database of health documents that can be accessed by residents of Slovenia via Patient portal zVEM. It is focused on the collection of data, which

should be part of the storage and exchange process between health care providers (Tepej Jočić, 2018). There can also be stored documents submitted by patients themselves (i.e. patient consent forms, access permissions and prohibitions, etc.). CRPD consists of patient health documentation and Patient Summary (PPoP). PPoP contains the most important patients' health care data in order to assist urgent health care treatment purposes. Access permissions concerning the data in the CRPD were regulated with the Infor-

mation Commissioner of the Republic of Slovenia, whereas the highest security standards had to be in place before the national roll-out of the CRPD.

Significant rise in usage of patient health documentation and PPoP in CRPD was detected in 2017 and 2018 (Figure 6).

Patient health documentation is mostly consisted of medical examination reports, diagnose records and hospital discharge letters (Figure 7).
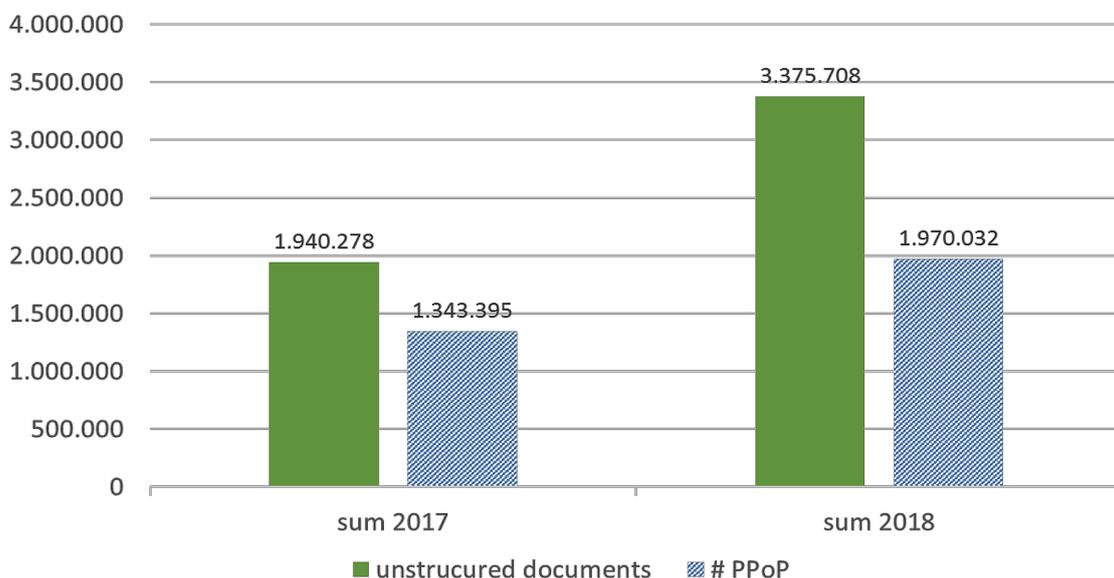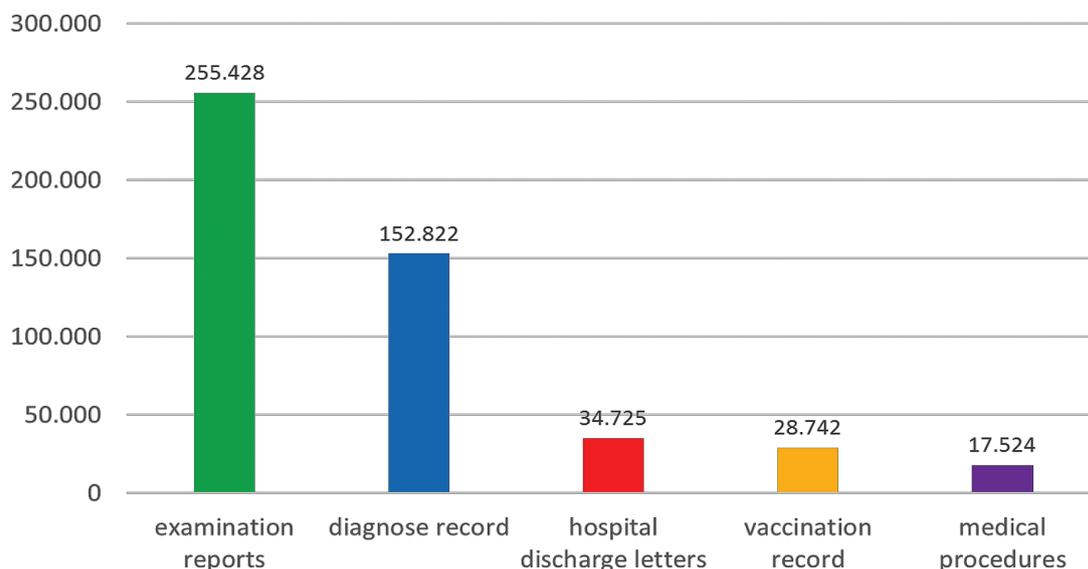

Figure 6: **Number of documents in CRPD per years**

Figure 7: **Number of documents in CRPD in 2018 according to different types**
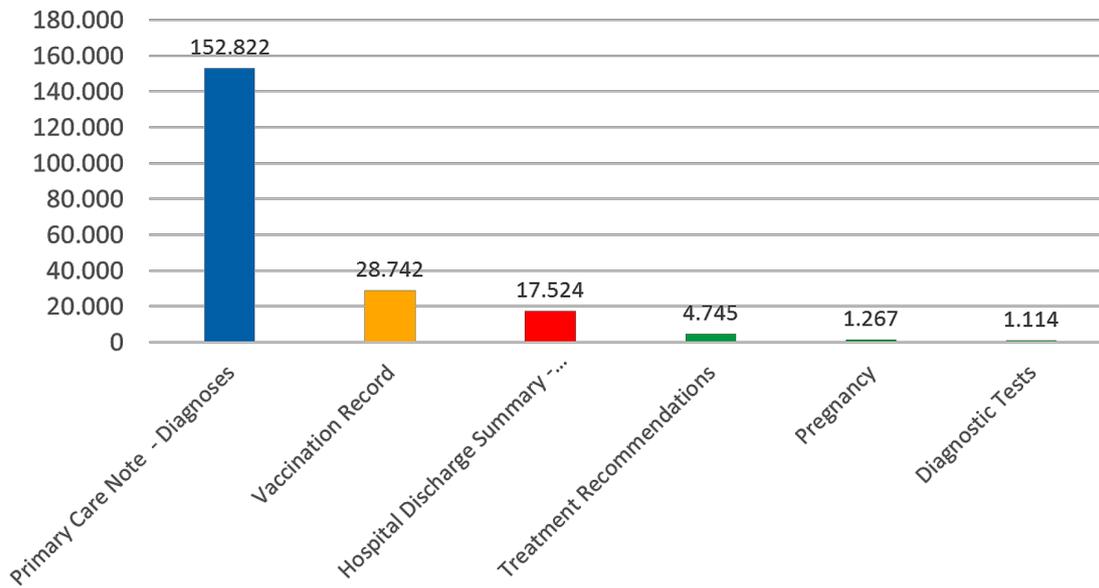
Figure 8: **Type of records in PPoP in 2018**

The highest number of documents in the PPoP present primary care notes about patient diagnoses, while vaccination records are in the second place (Figure 8).

3.4 National patient portal zVEM (one-stop health)

National patient portal zVEM provides users (citizens / patients) with access to their health data in a one-stop shop manner (Rant, Stanimirović, & Žlender, 2019). Upon registration with digital certificate patients can access to their prescribed and issued medications, issued referrals, hospital discharge letters, specialist reports and PPOP. They can also review waiting periods for particular health care services at individual health care providers and submit a consent or restriction concerning the use of their health data (for countries or health care providers). Access to patient health data is enabled only with a qualified digital certificate, which ensures credible and reliable user verification. The portal zVEM enables the exchange of information and better interaction between health care providers and patients, and can contribute to the empowerment of patients and greater responsibility for their own health. Full use of the national Patient portal zVEM, including the possibility of registration, was established at the beginning of 2017.

4 CONCLUSIONS

The research reveals that Slovenian eHealth solutions are broadly used by health care professionals and patients, and that their usage continues to rise on a monthly basis. Slovenia has developed effective eHealth solutions, which was proved also by the DESI report (DESI, 2018). The foundations for the establishment of the eHealth solutions were set in the eHealth project, co-financed by the EU. However, only the smaller number of eHealth solutions were actually implemented in that period. This research exposed that a tremendous effort is required in order to successfully implement even a simple national ICT solution. Accordingly, a well-coordinated action, persistence, and a great amount of resources have been invested in the national eHealth solutions, which are today implemented nation-wide and accepted by all users (i.e. ePrescription, eAppointment). Nevertheless, on the other hand, some eHealth solutions still need additional impetus and system support to become fully accepted and used. In order to take advantage of the possibilities offered by the ICT, the entire process of the development, implementation and use of eHealth solutions must be supported by systemic measures on various levels, and should be consistent with the interests and needs of the stakeholders. Despite some difficulties and setbacks in the initial stages, significant progress in implemen-

ting and using individual eHealth solutions has been noted over the last two years, which represents an important milestone. We hope that the latest events concerning eHealth confirm the increasing awareness of decision makers that modern eHealth solutions significantly impact the safety and quality of health care treatment, and also provide the necessary support at all levels of management in the health care system.

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