Development of an integrated e-health system in Croatia

Overview

In the mid-1990s, health outcomes in Croatia were below average for the European Union, reporting unfavourable trends towards a growing burden of chronic disease. Trends were partly attributed to suboptimal accountability arrangements, resulting in disparities in access, quality and efficiency of health services. Furthermore, misaligned payment incentives contributed to the overprovision of services in secondary and tertiary settings, to the disadvantage of delivering effective health promotion and disease prevention services. In response to this context, strengthening information flows for services and managerial data became a national priority. In the early 2000s, the government initiated the development of an electronic Central Health Information System (CEZIH) to connect stakeholders and provide real-time data on patients and providers. In 2007, CEZIH was first introduced and was expanded in 2009. Management and regulation of CEZIH is the responsibility of the Health Insurance Fund, under direction of the Ministry of Health. All general practitioners are currently connected to the system, with expansion to integrate other professionals underway. Numerous technological applications have been developed within CEZIH to improve efficiency, such as e-prescriptions, e-referrals and e-waiting lists. An e-citizens portal allows patients to interact with CEZIH and an additional portal for providers offers professional development and networking opportunities. Facilitated by CEZIH, in 2013, a new payment model for primary care providers was introduced to incentivize quality and efficiency improvements, promote the reorganization of providers into group practices, encourage the delivery of care in primary settings and increase health promotion and disease prevention services. Efforts are currently underway to strengthen data collection on performance to improve monitoring. At present, significant progress has been made towards achieving the government's vision of an open, connected and interactive e-health system. The development and expansion of e-health continues to be a priority for the Ministry of Health as detailed in the National Health Care Strategy 2012–2020.

Problem definition

Contending with many of the same challenges as other European countries, Croatia faces an increasing burden of chronic disease and an ageing population.

Contributing to this burden is an elevated level of lifestyle-related risk factors, such as smoking, obesity and the overconsumption of alcohol.[1,2] While formally health services are available to the population through national health insurance, in practice disparities in access and a lack of quality improvement mechanisms limit the ability of some populations to take full advantage of the services provided. Furthermore, misaligned incentives and a lack of financial transparency had concentrated services delivery in higher-level settings, limiting the ability of the health system to meet changing population health needs (Box 1).

Box 1
What problems did the initiative seek to address?

- Rising burden of chronic disease.
- Lack of standardization in care quality and disparities in access to health services.
- Concentration of care in higher-level settings.
- Inefficiencies in services delivery resulting from misaligned incentives and lack of monitoring.

Health services delivery transformations

Timeline of transformations

In the early 2000s, the Croatian government initiated the development of an open, connected and interactive e-health system as a means to address inefficiencies in services delivery (Table 1). In 2007, after several years of development, the Central Health Information System (CEZIH) was officially launched, connecting all 2300 general practice offices across the country and registering over 4 million patients. In 2009, CEZIH was expanded to incorporate a wider range of health care providers and various applications have been progressively added to CEZIH since its launch. Further development of e-health continues to be a government priority and expansion of CEZIH is planned.

Table 1
What were the chronological milestones for the initiative?

Early 2000s	Government initiates development of CEZIH in response to observed challenges in services delivery.
2007	Official launch of CEZIH; all 2300 general practice offices connected to the system.
2009	Upgrade of CEZIH; outpatient specialists, pharmacies and primary care laboratories integrated into the system.
2011	Rollout of e-referral and e-prescription applications.
2012	National Health Care Strategy 2012–2020 prioritizes development of e-health.
2013	Rollout of e-ordering and e-proposal applications; new model of remuneration for providers linked to performance data collected through CEZIH introduced; National Health Measures Programme launched to strengthen data collection.
2014	Launch of e-citizens portal; Ministry of Health's Strategic Plan 2014–2016 prioritizes development of e-health.[3]
2015	Piloting of electronic health records begins; national rollout anticipated in 2016.
Present	Continued development of e-health; integration of hospitals into CEZIH underway.

Description of transformations

Selecting services. Patients are provided with a comprehensive package of services covered under national health insurance. The initiative has emphasized the delivery of health promotion, disease prevention and disease management services to help promote healthier behaviours in the population and tackle upstream determinants of chronic disease. Further, some telemedicine services are now offered, such as cardiology and neurological check-ups, counselling and self-care supervision.

Designing care. Chronic disease management platforms integrated in CEZIH automatically prompt general practitioners to document key medical indicators. Updated evidence-based guidelines, protocols and care pathways for each medical specialty are being developed through the National Health Measures Programme.

Organizing providers. All 2300 general practice offices, as well as over 2500 primary care offices, 1100 pharmacists, 100 primary care diagnostic labs and 800 outpatient specialists are now connected through CEZIH, allowing for greater coordination among providers and improved continuity of care;[4] integration of hospital providers into CEZIH is currently underway. The e-referral application further supports continuity by streamlining referral processes and certain CEZIH applications, such as e-waiting lists and e-ordering (appointment booking), have made booking appointments easier. Use of technology for referrals has helped reinforce the status of general practitioners as system gatekeepers. Primary care providers have also been encouraged to self-organize into group practices, with the majority now working in this way.

Managing services. The newly created information technology department within the Health Insurance Fund is responsible for the management and regulation of CEZIH. Software is procured nationally and is given to all contracted providers. CEZIH identification cards are also provided to all employees within registered facilities. However, individual facilities are responsible for maintaining the necessary technological infrastructure to operate CEZIH software.

Improving performance. Ad hoc trainings have been offered to providers to equip them with the necessary skills to navigate CEZIH and take advantage of newly introduced technologies. A provider portal, known as ISL, creates opportunities for professional networking and makes educational materials available to providers. This programme enables providers to stay informed on the latest information in their field and develop professionally.

Engaging and empowering people, families and communities

The underlying vision behind the government's e-health strategy is to transition towards an advanced generation of user-centric and interactive health services. Many system applications, such as e-prescriptions and e-referrals, have been designed to improve and simplify care for patients, making services more accessible and convenient. The e-citizens portal enables patients to access their personal health information and receive health messages. The goal by 2020 is to interactively connect all patients to CEZIH through the portal to engage them as active participants in their care.

Table 2
How was the delivery of health services transformed through the initiative?

Before	After
Selecting services	
Comprehensive package of services covered by national health insurance, but lack of transparency causes service variability; weak provision of health promotion, disease prevention and primary care services.	Increased standardization of services covered by national health insurance; increased focus on health promotion, disease prevention and primary care services; telemedicine services introduced.
Designing care	
Care guidelines too vague, outdated or impractical.	Care guidelines currently being updated; chronic disease digital-monitoring platforms guide chronic disease management.
Organizing providers	
Concentration of providers in secondary or tertiary settings; primary care providers typically work in independent practices; communication and coordination between providers weak; waiting lists for appointments long.	Gatekeeping role of primary care providers strengthened; 65% of general practitioners organized in group practices; primary care professionals and outpatient specialists connected via CEZIH; e-referrals help increase continuity of care; e-waiting lists and e-ordering help decrease waiting times.
Managing services	
Providers contracted to deliver services by Health Insurance Fund; providers each operate their own information systems and submit paper invoices for services rendered.	Health Insurance Fund manages CEZIH; necessary software made available to all providers, but practices must maintain necessary infrastructure to run CEZIH.
Improving performance	
Weak accountability frameworks compromise quality and safety of care; incentives and opportunities for providers to improve performance lacking.	Accountability frameworks strengthened; ad hoc trainings made available to providers on CEZIH; ISL portal encourages professional development and networking.

Health system enabling factors

Since the early 2000s, the government has supported the development of CEZIH as a means to increase oversight over services delivery and enable provision of real-time data on patients and providers to facilitate health system planning (Table 3). The Ministry of Health has developed a supportive policy framework to aid this goal and the first priority of the National Healthcare Strategy 2012–2020 is to further the development of e-health. Significant technological investments have been made to establish CEZIH and develop useful software applications. These include the creation of the ISL portal for providers, development of applications such as e-prescription and e-referral, and implementation of decision support tools such as the chronic disease monitoring platform.

Contracts between the Health Insurance Fund and primary care providers stipulate that primary providers must use CEZIH to be paid. Furthermore, in 2013, a new model of remuneration was introduced by the Health Insurance Fund, linking payments for primary care providers to measurable quality and efficiency indicators collected through CEZIH. Financial incentives have been designed to encourage health promotion and disease prevention services, as well as limit unnecessary referrals to higher-level care. Group practice arrangements for primary care providers have also been incentivized under the new payment model, encouraging collaboration to achieve quality and efficiency improvements.

The National Health Measures Programme charged the National Institute of Public Health with developing new indicators for data collection. Once complete, the Ministry of Health and Health

Insurance Fund will use new indicators for health system planning purposes, as well as to improve assessment of providers' performance. The Institute has submitted an initial report, which is currently awaiting review.

Outcomes

Positive impact on health system performance as a result of CEZIH is evident (Box 2). Integration of information systems across primary care has been completed and CEZIH records all prescriptions, referrals, laboratory reports and visit summaries at the primary level. Digitalizing referral and prescription processes has resulted in efficiency and cost savings and, as the use of e-health continues to grow and develop, further quality and efficiency improvements are anticipated.

Box 2
What were the main outcomes of the initiative?

- Full national coverage of e-referrals and e-prescriptions at the primary level has been achieved; almost 100% of referrals to laboratories and prescriptions are sent electronically.
- Significant cost savings, estimated at €2 million, have been achieved as a result of switching to a paperless system.
- An electronic application for booking appointments has been introduced; over 4000 digital appointment requests are made by patients each day.
- Approximately 65% of general practitioners have become associated with group practices, whereas virtually no general practitioners were organized this way prior to the initiative.

Table 3
How has the health system supported transformations in health services delivery?

System enablers	Example
Accountability	• First priority of the National Healthcare Strategy 2012–2020 is e-health development.
Incentives	• New model of remuneration for primary care providers links payment to quality and efficiency indicators, in addition to encouraging the formation of group practices.
Information	• CEZIH collects data on patients and providers; goal is to integrate all patients and providers into the system by 2020. • National Health Measures Programme is developing quality and efficiency indicators to enable evidence-based strategic planning and effective use of incentives to drive performance improvements.
Innovation	• Several new applications and tools developed within CEZIH, including e-prescriptions, e-referrals and e-ordering.

Change management

Key actors

Vision and leadership from the Ministry of Health drove the creation of CEZIH. The Health Insurance Fund was appointed by the Ministry to manage implementation and coordinate necessary stakeholders and a new department for information technology was established within the Fund to develop applications for CEZIH. The National Institute of Public Health was appointed by the Ministry of Health to support activities by leading the National Health Measures Programme.

Box 3
Who were the key actors and what were their defining roles?

- **Ministry of Health**. Initiated the development of e-health and CEZIH; passed complementary legislation to enable digitalization; made development of e-health a policy priority.

- **Health Insurance Fund.** Manages and regulates CEZIH; contracts primary care providers to deliver health services and holds them accountable for performance via CEZIH.
- **National Institute of Public Health**. Led the development of the National Health Measures Programme with assistance from expert professional associations.

Initiating change

CEZIH was initiated in a top-down approach led by the Ministry of Health. The Ministry developed the necessary political and legislative framework to drive change through aligning incentive structures to support the initiative, making necessary resources available and mandating the uptake of CEZIH. Meetings between key government actors helped plan how data would be collected and organized.

Implementation

Upon launch of CEZIH, use of the system by primary care providers was mandatory and incorporation of payments for services into CEZIH necessitated timely uptake. Provision of ad hoc trainings and free software for providers supported the adoption and widespread use of CEZIH. Various applications of CEZIH are phased in gradually after being tested for several months in pilot projects.

The National Health Measures Programme is supporting improvements in assessment of data collected through CEZIH. New quality and efficiency indicators were developed in consultation with expert associations for each of the 48 medical specialties to ensure their relevance and specificity.

Test data for new indicators was then collected by providers using tables provided by the National Institute of Public Health, with weekly reminder calls and regular visits to providers conducted to motivate data collection. Information collected through the National Health Measures Programme is currently awaiting review by the Ministry.

Moving forward

Expansion of CEZIH is ongoing, according to the priorities laid out in the National Healthcare Strategy 2012–2020. Activities to integrate hospitals into CEZIH are beginning and an e-discharge application and electronic health records are currently being piloted. By 2020, the goal is to connect all stakeholders to CEZIH.

Highlights

- Strong government commitment and top-down leadership established the necessary conditions for widespread adoption of e-health.
- Data collected through the e-health system helped drive performance improvements.
- Aligning financial incentives served to encourage adoption of changes in clinical practice.
- Provider trainings were critical for encouraging uptake and ongoing use of new technologies.
- An e-portal for patients offered a means to engage patients in their own care.

1 World Health Organization. (2015). *European Health for All Database*
2 Dzakula, A. Saga A., Pavic N., Loncarek K., & Katarina Sekelj-Kauzlaric. (2015). Croatia. *Health Systems in Transition 16* (3): 1–162.
3 Ministry of Health of the Republic of Croatia. (2012). *National Health Development Strategy 2012-2020*. Zagreb: Auther
4 Stevanovic R. eHealth Strategy in Croatia. [PowerPoint slides] In TAIEX Multi-Country Seminar in eHealth.