European Conference on TACKLING NONCOMMUNICABLE DISEASES THROUGH DIGITAL SOLUTIONS

European Response to Noncommunicable Diseases 4.0: 10 years following the Moscow Declaration viewed through the lens of the European Programme of Work

14–15 December 2021
Moscow

GOOD PRACTICE EXAMPLES

WHO EUROPEAN OFFICE FOR THE PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
WHO European Conference on Tackling Noncommunicable Diseases through Digital Solutions

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Good Practice Examples

WHO European Office for the Prevention and Control of Noncommunicable Diseases
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Armenia is no different from other countries around in that noncommunicable diseases (NCDs), particularly cardiovascular and malignant diseases, obstructive pulmonary diseases and diabetes mellitus, are one of the main causes of morbidity, disability and premature death.

The four most common NCDs account for 85% of deaths, and approximately 20% of these are premature. One in two Armenians dies from cardiovascular diseases, while one in three dies from a malignant disease. Lung cancer mortality is six times higher among the male population.

The National Health Information and Analytical Centre of the National Institute of Health of the Ministry of Health of the Republic of Armenia collects data on morbidity and mortality for various disease classifications. Data is collected electronically using administrative statistical reporting forms from every health facility (over 600) that provides primary medical, hospital and specialized care, regardless of the type of ownership.

Reports are produced based on the data collected, which is disaggregated by gender, age and region and then interpreted. The data is submitted to the Government of Armenia, various government agencies, World Health Organization (WHO) and other international organizations. Morbidity and mortality data (including from NCDs), as well as information on human resources availability and hospitalizations at each health facility are presented on the Google Maps platform (1).

Four “Health system performance assessment” reports have been published since 2007 with technical support from WHO and financial support from the World Bank. These reports highlight the problem of NCDs, the quality of treatment of patients with arterial hypertension and diabetes mellitus, and the prevalence of NCD risk factors (smoking, alcohol consumption, obesity, high blood pressure, low physical activity, etc.). Trends in the prevalence of NCD risk factors were studied for the period 2007–2016. The data is disaggregated by age, gender, region, education level and wealth (2).

Monitoring and interpretation of NCD mortality and morbidity data and factors that lead to their development provided the basis for the creation of national strategies and programmes aimed at strengthening cooperation between various sectors. Preventive measures to reduce the burden of NCDs were introduced as a result. The following strategies have been implemented since 2008: the Strategic Programme and Action Plan for the Prevention and Control of NCDs for 2016–2020; the Strategic Programme and Action Plan for the Prevention and Control of Cardiovascular Diseases for 2013–2018; the Strategic Programme and Action Plan for the Prevention and Control of Diabetes Mellitus for 2013–2018; the Strategic Programme and Action Plan for the Prevention and Control of Oncological Diseases for 2013–2018; and the Tobacco Control Strategy for the years 2017–2020 and its associated Action Plan. The following national programmes and action plans have been introduced: the Strategy for Promoting Healthy Lifestyles for 2021–2026; the Fight Against Malignant Neoplasms, 2021–2026; and the Fight Against Diabetes Mellitus, 2021–2026 (3). A new NCD strategy is being developed. Data on the prevalence of risk factors served as a basis for introducing screening programmes for the prevention and early detection of NCDs.
Within the framework of cooperation between the Ministry of Health of the Republic of Armenia, the WHO Regional Office for Europe and the WHO European Office for the Prevention and Control of NCDs, the STEPS survey was conducted in 2016 to study the prevalence of NCD risk factors among the Armenian population aged 18 to 69 years. In 2018, the WHO European Childhood Obesity Surveillance Initiative (COSI) was conducted in Armenia to investigate the prevalence of childhood obesity. STEPS and COSI studies contributed to the introduction of epidemiological surveillance of the prevalence of NCD risk factors among children and adults in Armenia. The STEPS data became the basis for assessing the economic impact of NCDs, preparing recommendations and the WHO report: “Prevention and control of noncommunicable diseases in Armenia: the case for investment” (4). Since 2017, an e-health system has been introduced in Armenia in all medical institutions with state funding. In order to monitor and prevent NCDs, registries for oncological and mental diseases, as well as diabetes mellitus, have been developed in the e-health system.
One of the main goals of the Armenian government is the implementation of a holistic e-health system, through which it is planned to collect data at the individual level.
Impact

Data on NCD morbidity and mortality and the prevalence of NCD risk factors served as a basis for the introduction of a number of prevention programmes to reduce the NCD burden. A programme of preventive examinations has been implemented at the primary level.

An NCD early detection screening programme was launched in 2015 (for diabetes, arterial hypertension and cervical cancer).

The Stent for Life Initiative was introduced in January 2015, which involves the placement of coronary artery stents in patients following myocardial infarctions. Over 10,000 patients have had the surgery over the past six years.

A programme for the Thrombolytic Treatment of Acute and/or Subacute Ischemic Stroke was launched in 2019 as part of a government order and the development of mechanical thrombectomy. The programme, which aims to organize therapy to help eliminate cerebral vessel blockages and prevent strokes, is key for reducing mortality and disability from cardiovascular diseases.

A programme to strengthen oncological care has been developed to reduce the burden of cancer illnesses. A breast cancer screening programme has been launched in one region.

Screening studies to identify colorectal cancer are planned.

On February 13, 2020, the National Assembly adopted the Law on the Reduction and Prevention of the Harm Done to Health as a Result of the use of Tobacco Products and Their Substitutes, whose provisions apply to tobacco products and substitutes (except those used for medicinal purposes). This new legislation bans smoking in all enclosed public places, workplaces and public transport. A ban on the use of tobacco products and substitutes in public catering facilities, including open air facilities, will enter into force in March 2022. The law prohibits advertising, promoting and sponsoring tobacco products and substitutes. From 2024, tobacco products will be sold in plain packaging. The first draft of the law was developed in 2017.

In 2020, for the implementation and conduct of screening studies for the prevention of noncommunicable diseases, the Ministry of Health of Armenia became the laureate of the UN interagency working group on the prevention and control of noncommunicable diseases.
References:


Description

Over the last few years, the Public Health and Reforms Centre of the Azerbaijan Republic has been focusing on using digital technologies in healthcare. Developing mobile apps for smartphones and tablets is one of the principal areas in these activities. Most apps are intended to control non-communicable diseases. The very first app, “Ürayiniz əqərədən” (“Take care of your heart”) provided users with information on cardiovascular disease prevention. Additionally, users can input their blood pressure figures and forward the information to their doctor by email. The app has a built-in alert reminding users to take the medications prescribed by their doctor. “Şəkərli diabet” (“Diabetes”), an app for diabetics, has a similar functionality. Additionally, the app has a carb unit calculator. Another app, “Sağlam qida” (“Healthy Foods”), helps control such risk factors as an unhealthy diet. It has a calorie, food nutritional value and BMI calculators, and other functions. This app, like that on the dangers of smoking, “Tütündən imtina et” (“Quit Smoking”), enjoys great popularity among mobile device users. These apps have been downloaded thousands of times and, crucially, they are not deleted after being downloaded but remain on the user’s phone for a long time, which indirectly suggests that mobile device users use these apps. The app on the dangers of smoking has several interesting and useful features, such as a calculator of money spent on cigarettes, or a visual representation of health improvement over time after a person has quit smoking. Recently, we have developed a website and a mobile app (with the support of the WHO) that helps monitor smoking in public eating places.

Impact

Unfortunately, developing mobile apps and making them available to users does not guarantee that potential users will, indeed, use them. It requires a lot of preliminary work with the public and a high level of sanitary literacy among them. Another major obstacle is doctors having little interest in their patients using these solutions. Currently, our Centre is surveying primary care doctors to determine to what degree doctors, when consulting patients, explain the steps necessary to prevent non-communicable diseases, how they use our mobile apps in the process, and how well they know these apps, etc. Even though our survey is still under way, we can confidently state that doctors know little about how useful mobile apps can be and, even if they are aware of their benefits, they are not ready to use them regularly. The same applies to the possibility of holding telemedical consultations using the “Videodoctor” app developed by our Centre. This is owing to the doctors having inadequate IT use skills and to absence of regulatory documents that would mandate doctors to use these technologies, etc.

A similar situation is emerging with respect to many of the Internet resources our Center has developed. They require a massive promotion campaign involving all communication channels (social networks, TV, etc.) to increase people’s awareness of these resources, inform the public about how useful they are and promote their extensive everyday use.
A large-scale STEPS 2020 study on the prevalence of noncommunicable disease risk factors in the Republic of Belarus was carried out last year as part of the “Preventing noncommunicable diseases, promoting healthy lifestyle and support to modernization of the health system in Belarus 2016–2019” (BELMED) project funded by the European Union and implemented by UN agencies in cooperation with the Ministry of Health of the Republic of Belarus, with addition support from the Government of the Russian Federation and WHO European Office for the Prevention and Control of Noncommunicable Diseases.

The study is a follow-up to the first STEPS study conducted in the Republic of Belarus in 2016, which was carried out using a digital innovation platform provided by WHO. To collect information provided by respondents Interviewers used an e-form app installed on their tablets with an internet connection and geolocation functionality. The digital research database was updated online, paper forms were not used. A total of 5385 people aged 18–69 from across the country took part in the study, making the sample 93% representative. The STEPS 2020 study included a survey using a standardized WHO questionnaire on behavioural risk factors for noncommunicable diseases (smoking, alcohol consumption, physical inactivity and an unhealthy diet), body measurements (weight, height, waist circumference, blood pressure), and laboratory tests (blood glucose and cholesterol tests). The study itself was carried out by the Republican Scientific and Practical Center of Medical Technologies, Informatization, Management and Economics of Public Health in collaboration with experts from the WHO European Office for the Prevention and Control of Noncommunicable Diseases.

In addition to improving epidemiological surveillance of the prevalence of NCD risk factors, the STEPS study also made it possible assess the availability of medical care, the prevalence of depression and oral health through the inclusion of three additional (optional) modules: “Access to Medical care and the Personal Experience of the Patient,” “Symptoms of Depression” and “Oral Health.”

The results obtained in the STEPS 2016 and STEPS 2020 studies were taken into account when assessing the effectiveness of measures implemented under the “People’s Health and Demographic Security of the Republic of Belarus for 2016–2020” programme for NCDs, as well as when planning targets for the new State Programme for 2021–2025.

An economic assessment of the damage caused by noncommunicable diseases based on the data from the 2016 STEPS study was carried out, and it was determined that “Best Buys” were the optimal public health intervention for preventing NCDs in Belarus in terms of a cost-benefit analysis. The results were used to develop recommendations for the WHO report “Prevention and control of NCDs in Belarus: The case for investment” (1).

For example, the 2020 STEPS report confirmed the effectiveness of public health measures in reducing the number of smokers in the Republic of Belarus. The number of male smokers has decreased significantly since 2016 (from 48% to 42% in 2021). This was the year that health warnings appeared on cigarette packs in the form of photographs and pictograms illustrating the dangers of smoking and cigarettes were removed from open display at points of sale. The introduction of smoke-free legislation in all indoor premises (including cafes, restaurants, hotels and long-distance trains) in 2019 was also a factor.
According to WHO, these measures will reduce smoking prevalence by 16% and save 116,000 lives from tobacco-related premature deaths over the next 40 years (2).

References:


Description

In 2007, the Republican Diabetes Mellitus Registry was created as part of the Diabetes Mellitus State Programme for 2004–2008 and introduced into practical health care in the Republic of Belarus.

The Republican Diabetes Mellitus Registry was created for the following purposes: to monitor the health of patients with diabetes mellitus and the development of complications associated with the disease; to assess laboratory test results; to organize the provision of medicines and medical devices to help patients monitor their own health; to assist in clinical decision-making; for clinical examinations of patients; for the epidemiological monitoring of diabetes mellitus; and to obtain expert assessments of the quality of medical care and the pharmaco-economic efficiency of certain groups of medicines used to treat diabetes mellitus.

The Republican Diabetes Mellitus Registry ensures that patients are registered individually and that a dynamic database on diabetes mellitus is created for years to come.

The software used for the Republican Diabetes Mellitus Registry was developed by experts at the Republican Scientific and Practical Center of Medical Technologies, Informatization, Management and Economics of Public Health alongside leading endocrinologists in the Republic of Belarus.

The Republican Diabetes Mellitus Registry in health care organizations at three technological levels of medical care: district (municipal), regional and national (1).

Impact

The Republican Diabetes Mellitus Registry is key to the provision of medical care for diabetes patients in Belarus. It is a tool for managing the disease at both the individual and populational levels.

The Registry is regulated by Order No. 459 of the Ministry of Health of the Republic of Belarus “On Improving the Activities of the Republican Diabetes Mellitus Registry” dated 5 May 2011, which approved the information required and the procedure for entering it into the Registry’s database when a patient is diagnosed with diabetes. The Registry is accessible for endocrinologists working in health care organizations in Belarus, and thus includes information about all patients in Belarus who are registered at health care organizations.

Since its launch, the Registry has accumulated information on 478,662 patients, of which 343,191 are alive and registered at health care organizations in Belarus as of 1 January 2021 (98.4% of all diabetes patients).

Monitoring of laboratory studies of patients through the Registry’s database allowed us to increase the number of HbA1c studies from 0.794 (2015) to 1.032 (2020) per diabetes patient per year. Quality control of care contributed to a decrease in cases of blindness in type 1 diabetes patients by 17.6% – from 1.08 (2015) to 0.89 cases (2020) per 100 patents, and by 33.3% in type 2 diabetes patients – 0.15 (2015) to 0.10 (2020).

The number of lower limb amputations in type 1 diabetes patients fell 14%, from 1.47 (2015) to 1.29 (2020) cases per 100 patients, and 25.7% in type 2 diabetes patients, from 0.70 (2015) to 0.52 (2020).
Analytics obtained through the Diabetes Registry are used to create the relevant sections of state programmes, plan NCD prevention and control measures, and develop target indicators for state programmes (e.g. the National Demographic Security Programme for 2011–2015, the People’s Health and Demographic Security state programme for 2016–2020, and the People’s Health and Demographic Security state programme for 2021–2025).

References:

Description

Integration of genomics within the health-care system is a complex process that requires careful planning involving many stakeholders. Bringing so-called omics medicine (the next generation of laboratory tools that can open new windows into the molecular makeup of individuals) to patients is a major challenge for health-care systems. In many countries, some form of omics testing is now being provided.

A Roadbook for the implementation of next-generation sequencing (NGS) in clinical practice in oncology and haemo-oncology in Belgium has been developed by Sciensano, the national public health institute of Belgium. The Roadbook was approved by the Ministry of Health in 2016 and outlined 10 actions that needed to be completed before NGS could be integrated structurally within the health-care system. These actions were implemented over the course of almost five years, reflecting the complexity of launching such an initiative at the national level.

Action 6 of the Roadbook was to develop a digital technical platform for the central collection and storage of generated NGS data in a uniform and secure manner to facilitate data exchange and use for different purposes (e.g. quality analysis, outcome analysis, reimbursement reallocation or clinical and public health research). The development of this platform was assigned to the Healthdata.be service established at Sciensano for the collection and management of health data in Belgium.

Implementing NGS into clinical routine diagnostics is a new and complex process, requiring a pilot phase with close monitoring and assessment at the end of the transition period. It is also anticipated that the organization of NGS, data analysis and interpretation within a network infrastructure will facilitate the process of implementation. In this way, the huge investments in infrastructure are expected to gradually decrease and pooling of expertise in NGS and its analysis will be stimulated.

Impact

The platform has been operational since mid-2019 in 24 medical laboratories within Belgium hospitals. In total, more than 20,000 records have been uploaded to the central database over a two-year period. It is too early to analyse the impact on care or health outcomes; the methodology and infrastructure to perform such evaluation are being rolled out in a number of nationwide precision oncology trials. Users of the service are yet to see what the benefits of the service might be as it is not yet fully operational. Further automatization of data collection is also under consideration. Centralized data collection of complex tumour profiling in routine diagnostics has allowed health insurance providers to have a clearer view on expenses in quasi-real time and this has allowed data-driven reallocation of budgets.
The pilot innovative intervention used a mobile application to support self-management in diabetes. "Empowering people with diabetes within the framework of JA CHRODIS recommendations and criteria through the use of mHealth technology" was a deliverable of the Joint Action on Chronic Diseases 2017–2020 (JA CHRODIS PLUS), a European Union initiative. The pilot was implemented between 2017 and 2020 by a core team from the National Centre of Public Health and Analyses, Sofia, and local leadership groups (the Bulgarian Diabetes Association, various health-care specialists in the field of health promotion and disease prevention, and representatives from patient associations). The leading premise of the pilot was that m-health technology is widely used and could assist patients to adhere to diet, exercise and medication plans, while the intervention’s framework for the implementation uses a Recommendations and Criteria Toolkit to support, improve, monitor and evaluate the quality of diabetes care.

Diabetes self-management is considered a cornerstone in preventing long-term complications. Every individual can succeed in achieving good control over his/her diabetes when following several rules: taking prescribed medications, monitoring blood sugar levels, having a healthy diet and exercising regularly. The aim of the intervention was to promote self-management and empowerment of patients with diabetes through continual and daily assessment with the help of a mobile application as a means towards sustainable and scalable care (1), (2), (3).

Impact

The pilot intervention recruited two groups of participants. Group 1 received the m-health embedded education module and personalized feedback and Group 2 received the m-health embedded education module and no personalized feedback. The specific aims were to (i) investigate whether the m-health tool enables people with diabetes to obtain more control over their disease; (ii) examine the extent to which personalized feedback and a health education module contribute to patients' compliance; and (iii) assess practitioners' satisfaction with patients' performance.

The intervention results indicated benefits for patients; 12 out of 19 participants reported that the m-health tool met their needs and 11 indicated that their control over the disease had improved. The target population benefited through the easy-to-use mobile application and the shared decision-making and educational information available in the process. The pilot involved allowed users to have access to various stakeholders and that was further reinforced by the support of the technical team. Group 2 praised the fact that a practitioner was involved in the pilot but felt that the feedback needed to be organized in a more personalized manner, reinforcing the practitioners' view of the importance of two-way communication between patients and physicians.

The intervention provided an alternative therapeutic support for people with diabetes. The report of the implemented intervention describes the baseline and the context analyses, providing further deliverables of lessons learned, including enablers and barriers, and identifying next steps for fostering quality of care for people with diabetes. The sustainability strategy considered a range of contextual factors (e.g. innovation, cultural trends and general epidemiological trends) as well as the existence of broad support among the implementation group and the relevant stakeholders.
References:


China has established a relatively comprehensive NCD monitoring system, including the National Disease Surveillance Points Cause of Death Surveillance System, the China Chronic Disease and Risk Factors Surveillance System, the Surveillance System of Nutrition and Health Status of Chinese Residents, the Surveillance System of Chronic Obstructive Pulmonary Disease, the Cancer Registration System and the Cardiovascular and Cerebrovascular Events Registration System.

The Cause of Death Surveillance System covers 605 counties/districts in 31 provinces (autonomous regions or municipalities). Medical institutions and primary health-care institutions collect information on deaths through a direct network reporting system and supplement and correct the death information held by the Household Registration Department and Funeral Department, which is the nationally and/or provincial representative surveillance system.

The National Cancer Centre of China (NCC China) is the Chinese Government's principal agency for conducting national cancer surveillance, cancer control programmes, cancer research and training. NCC China has created the Cancer Registry Network Platform of China, which is an online nationwide reporting system for cancer registries and hospital data systems. The main functions of this platform include data collection, quality control, provision of patient follow-up information, online statistical analysis and real-time result presentation. The platform provides services for over 10 800 registered organizations and 49 000 active users. It effectively improves the quality and the efficiency of conducting the cancer registration in China.

Based on the National Disease Surveillance Points system, the China Chronic Disease and Risk Factors Surveillance System and the Surveillance System of Nutrition and Health of Chinese Residents conduct surveys in 302 counties/districts every 3–5 years. The Surveillance of Chronic Obstructive Pulmonary Disease is conducted in 125 counties/districts. During the process of collecting data, investigators commonly use tablets and laptops to input and manage information collected by face-to-face field interviews, physical measurement, pulmonary function examination and laboratory testing.

The Chinese Centre for Disease Control and Prevention (China CDC) has established a National Information Security System for improved national disease prevention and control. Its goal is to link health-related databases from all relevant systems to collect health information concerning the full life course of the population. The interlinking databases include the population database, hospitalization databases, disease prevention and control databases and health management databases from health-care services and medical insurance providers. Health information about risk factors, infectious diseases, NCDs, vaccination and health management can support policy- and decision-making. Data usage is in accordance with need and authorization (1).
Impact

The Cause of Death Surveillance System has recorded real-time information online since 2008 and the number of deaths reported to the System has increased gradually. The System integrates functions of death reports, quality control information, data checking and provision of feedback, data verification and information communication. Mortality data for SARS-CoV-2 infections have also been collected through the System. This System plays an important role in improving the use of data on common causes of death for policy-making. The Cancer Registry Network Platform of China functions in the same way, allowing improved effectiveness for tracking patients’ progress and for automatic analysis. The information collection and management platforms were established through two regular and continuous cross-sectional surveys carried out by the China Chronic Disease and Risk Factors Surveillance System and the Chronic Obstructive Pulmonary Disease Surveillance System. The functions of the platforms include sampling, information collection from on-site investigations, biological sample management, laboratory quality control and information upload, three-level onsite quality control, information feedback of survey data and automatic data analysis. The quality of investigation data can be ensured through real-time query, quality control and analysis. National surveillance systems can provide most of the monitoring indicators recommended by WHO on the incidence of disease, deaths, risk factors and the corresponding national response.

There are also some regional digital technology big data platforms to monitor, prevent and control NCDs. For example, the health data platforms in the Yichang District of Hubei Province and the Ningbo District of Zhejiang Province have integrated information about medical institutions, primary health care, health insurance, drug management, environment surveillance and health-related education, among others. These platforms play a huge role in disease surveillance, health management, treatment result assessment, policy-making and development and scientific research. In some local areas, wearable devices and apps are used to comprehensively assess and intelligently manage public health; these have proved cost-effective by increasing control of NCDs.

References:

One of the best performances within e-government in Croatia is in the use of e-health services. An estimated 22% of citizens use these services, which is above the average of 18% for the European Union. The Central Health Information System of Croatia offers e-prescription, e-referral, e-booking, electronic health records (EHRs), a patients’ portal (Health Portal), e-sick leave and e-medical aids, as well as e-health care and e-work injury services for employers. An important part of the upgrade of the System’s functionalities between 2016 and 2020 has been the implementation of a central database of EHRs and communication with patients either through the Health Portal directly or through the e-Citizens system. The aim was to further strengthen the role of patients in the system and provide online access to medical records for other health-care providers and stakeholders outside of the primary care level, who may be provided with patient summary information as necessary. The long-term goal is to streamline authorized and secure access to comprehensive medical and administrative data needed for the improvement of unplanned health care and, thus, ultimately remove some of the administrative burden for medical staff. Authorized access to the system uses the highly secure national e-Citizens authentication method and credentials (based on the National Public Health Information System infrastructure). Patients are able to see all their prescribed and dispensed medications from primary care; laboratory results from biochemistry laboratories within the public primary care network; medical reports from their visits to general practitioners (GPs); and consultation notes from hospitals and outpatient facilities. However, the last is not yet fully comprehensive; it does not include records created prior to the system’s inception date or appointments with specialized hospital care services. The system is almost fully read only, with interactive functions such as patient messaging from GPs and other selected practitioners in dental medicine and gynaecology, as well as requests for e-prescriptions for chronic conditions.

What is also important to highlight is that the system allows each individual to manage access rights to their clinical data for other authorized users within primary care, using the Opt-In method. Using the settings, patients can control access for their elected dentist, specialists in outpatient settings, pharmacists and for emergency services. They can also authorize the cross-border sharing of information with European Union Member States as part of the Patient Cross-border Rights Directive (2011/24/EU). In 2020 and 2021, these facilities have been extended to a mobile app which is available for both Android and iOS platforms.

Croatia continues to strengthen its e-health systems and e-health solutions. Once the EHR is fully implemented nationally, Croatian patients will see particular benefits from improvements in the digitalization of the national health-care system through better and more efficient communications within the system and among authorized medical staff. The parts of the system that have been implemented so far have greatly contributed to raising health service quality and upgrading will provide further improvements, even though the full benefits will only be clear once all legal preconditions are met, planned integrations among users are implemented and the system becomes fully functional at national level (1), (2), (3).
Impact

The Croatian e-health system was primarily designed to improve and simplify the delivery of care to patients; for example, patients no longer have to collect laboratory test results as these are directly accessible by doctors. Doctors can also access information on the dispensing of prescribed medicines and, thus, monitor compliance. The main potential benefits for health professionals include a substantial reduction in the level of administrative tasks, which are now fully automated; fewer personal visits by patients for simple check-ups and prescription renewals; and improved communication with other stakeholders in the system. Health-care authorities can benefit from savings on printing of prescriptions and referrals; gains in productivity and efficiency; increased patient safety; and automated checking of insurance data. Moreover, access to real-time information should enable informed decision-making and increase the efficiency and equity of health-care provision (e.g. through monitoring prescribing and referral patterns).

In the period 2016–2020, the number of citizens who accessed their EHRs through the Health Portal increased five times, with 5% of those registered with the e-Citizens system using the Portal at least once. During 2020 and 2021, approximately 10% of Croatian citizens used the Health Portal at least once, encouraged by further upgrades of the system and increased need to access health services online during the COVID-19 pandemic.

The Digital Croatia campaign was launched in May 2019 to further promote digitization of the country and assist the public to activate their electronic identity cards, log into the e-Citizen system and access the My Administration portal. The Digital Bus has become a flagship emblem of the initiative, with a focus on familiarizing the public with digitalization and promoting digital access to public information and services. Citizens felt empowered to activate their electronic identity cards and to actively search for information by themselves. The project resulted in a significant increase in new users of e-government services, especially the Health Portal.

References:


The Croatian Diabetes Registry (CroDiab) was established in 2000 with the aim of improving the health care of people with diabetes. Data were provided by all health-care institutions and employees by submission of databases directly if they were structured in accordance with the Croatian Institute of Public Health’s instructions for completing individual health statistical reports, by entering data into the CroDiab online system or by submission of paper forms. Since 2004, use of CroDiab has been mandatory for all primary and secondary health-care physicians who have people with diabetes in their care. Since the inclusion of CroDiab in the National Public Health Information System (NAJS), data have been collected by linking databases relevant to the monitoring of people with diabetes. Exchange of data with the database of the Central Health Information System of Croatia has occurred since 2013. From 2015 data from the electronic registering system for patients with NCDs in primary health care (known as panels) were included, and since 2017 hospitalizations, rehabilitation, daily hospital attendances and the register of health professionals are all included through the connection of the CroDiab register to NAJS.

CroDiab is located within NAJS in the domain of Chronic Noncommunicable Diseases and Conditions in the Oracle database storage and management system (with software written in Java). As CroDiab contains information about patients on an individual level and also contains personal data, direct access to data in CroDiab is restricted by authority and only registry administrators have access. Connection of the central system with external networks is achieved through a distribution and protection layer. At the network layer, Internet access is strictly separated from access from user networks. Protection of services and applications is provided, as well as protection of access between individual user networks.

CroDiab is the only registry that directly receives data from panels completed by general practitioners (GPs), although a similar pregnancy panel is under development. Diabetes panels are especially valuable in public health medicine because they not only serve to monitor indicators but also provide a checklist for GPs and a reminder to regularly monitor patients and perform annual diabetic control assessments, which has been shown to have significant impact in improving diabetes control.

In addition to monitoring diabetes indicators, CroDiab data are also used for public health interventions. For example, the analysis of indicators revealed that screening for glycated haemoglobin (HbA1c) was often unavailable in primary health care. An initiative of the Croatian National Institute of Public Health, with interinstitutional cooperation, has ensured that GPs could carry out this assessment since 2013. In 2021 the measurement of the albumin/creatinine index also became available to the entire population within primary health care (1).
Impact

The core module for monitoring diabetes indicators was established in 2000 within CroDiab, while checklist reminders were created within diabetes panels in all primary care units in 2015. There are 2403 family physicians in Croatia, and all have electronic registering systems for patients with NCDs and use them, although with variation in the number of panels and the number of patients with diabetes covered. A study carried out in 2021 found that checklists were perceived as a positive initiative by GPs; however, there were areas requiring improvement. The study found that education on the checklists and regular feedback from the checklists could contribute to better monitoring of patients with diabetes. As a result, increased feedback and other improvements have already been initiated as part of activities to develop CroDiab and better empower GPs (2).

References:


Description

An integrated digital health system for sharing appointments has been successfully implemented nationally. Integration is an ongoing process with the system continuing to be integrated more deeply and widely into national registers and databases. This allows for more national and local surveillance opportunities regarding NCDs.

AI is used for prevention, diagnosis and treatment services. It allows for faster and more precise diagnoses and more personal targeted treatment, and it enables the identification of prevention initiatives.

Impact

With regards to the prevention of NCDs, an ongoing project has examined indications of deterioration of health for patients suffering from either chronic obstructive pulmonary disease (COPD) or heart disease in the North Denmark Region. An algorithm has been developed that predicts a patient’s deterioration in the early stages with high rates of success. This success has led to investigations into the possible use of the algorithm for home monitoring of patients with heart disease. The algorithm will be tested further in the current telemedicine system.

Home monitoring gives patients the ability to monitor their health in their own home, while a nurse can overview and assess results and contact the patient if signs of deterioration are noted in order to investigate if further treatment is needed.

Currently, we do not have any figures regarding user satisfaction available for disclosure. However, evaluations suggest the following benefits.

- Increased knowledge and competence for self-care among patients. Telemedical home monitoring for relevant patients with COPD can contribute to increasing their understanding of the condition and their self-care competences. Prior knowledge of the technology used and the patient's own illness are not crucial prerequisites for success in connection with the use of telemedical home monitoring.
- Influence on how the patients live with their own condition. Telemedical home monitoring can make individuals with COPD more active and involved in their own treatment process.
- Increased quality of life, patient confidence and satisfaction. Telemedical home monitoring for citizens with COPD is very likely to have an enhancing potential on their quality of life, particularly for those with severe COPD (stage III in the GOLD classification). In large-scale projects, the level of patient confidence and their self-perception of their health have developed positively as a result of home monitoring.
Description

Estonia implemented a clinical decision-support system in May 2020: the Evidence-based Medicine Electronic Decision Support (EBMeDS). The EBMeDS system brings evidence into practice by means of context-sensitive guidance at the point of care. EBMeDS is a well-known and widely used program developed by the Finnish Medical Society (Duodecim). The system receives structured patient data from electronic health records and the databases of local health-care professionals and provides reminders, therapeutic suggestions and diagnosis-specific links to guidelines at the moment of consulting or diagnosis with a patient. The database contains both international and local Estonian clinical guidelines and is updated regularly. The system is connected to all Estonian primary care software systems, allowing clinicians to receive alerts and suggestions in the most convenient way in the software system they use on a daily basis. An instructional video for primary care specialists for using the clinical decision support system is integrated into their information system with sound in Estonian and subtitles in Russian (1), (2).

Impact

Although similar tools to EBMeDS are in use in other countries for a single general practitioner or medical institution, Estonia is the first to implement such a tool nationwide. The system is used by all Estonian general practitioners and nurses: approximately 2000 users. The service was implemented in spring 2020 and, although the COVID-19 pandemic made implementing such a new health service more difficult, health workers have received it well. Initial surveys have shown that 84% of Estonian general practitioners use the tool regularly and are pleased with it. The president of the Family Physicians Association of Estonia commented that clinical decision support is an essential digital tool for family doctors, which helps them to make decisions for each individual patient based on their previous health history and data. Monitoring and development are ongoing to increase its user friendliness and gather more feedback from doctors.

References:


In Finland, online systems have been developed for public access to support health and well-being. The Omaolo portal allows access to a range of support services.

The Duodecim symptom checkers portal is a service assessing an individual health problem or symptom that then provides an assessment of the need for and urgency of treatment and automatically directs the person to the appropriate assistance.

The Duodecim Health Check and Coaching programme is a computer programme developed by Duodecim (Finnish Medical Society) and the National Institute for Health and Welfare that assesses lifestyles and mental well-being, and provides tools to improve these. The health check includes approximately 40 questions related to a person’s characteristics, attitudes and lifestyles, all factors that have been found to affect life expectancy. Mental and physical well-being go hand in hand. For example, good stress management and confidence in the future will help a person to lead to a healthy lifestyle.

The Omaolo well-being coaching programmes encourage people to change their lifestyle and way of life to improve well-being. There are 10 different coaching programmes available:

- a programme for families with children
- a programme for quitting smoking
- a health-enhancing exercise programme
- health-promoting nutrition training
- positive interaction in a couple relationship
- reducing alcohol use
- reducing everyday fretting
- resolving conflicts in a relationship
- sleep coaching
- weight management (1), (2), (3).

The Omaolo system has been in use since February 2019. By September 2021, Omaolo was already being used in nearly 200 municipalities and has been used more than 400,000 times a month in 2021, on average.

The use of Omaolo is expected to save face-to-face time for the workforce; for example, nursing time saved can be used for other patient care. It has been calculated that more than 35 person-days of labour have been saved and used for other customer work through the use of appointment reservations made through the Omaolo coronavirus symptom assessment check-up (January–May 2021).
DigiFinland Oy is the manufacturer of the Omaolo service, and as a stakeholder is responsible for the production, maintenance and support of the service in cooperation with selected suppliers. Development work is carried out in extensive cooperation with organizations that use Omaolo. The perspective of the service end-user and the feedback received are also a key part of the development of the service. The development of the service complies with ISO:13485. The key principle for the deployment of the Omaolo service is that organizations will achieve benefits not only by introducing a new digital service but also by altering their practices. The key aim is the development of the activities, operating models and processes of the organization that deploys the Omaolo service.

A survey of the views of a stratified random selection of the adult population indicated that the quality of the service was considered as "good" (4).

References:


Description

Cardiac implantable electronic devices have undergone huge technical improvements since the 1980s, increasing the range of indications for their use. They now monitor 15 million patients across Europe and the United States of America. These devices are now capable of sending information remotely to the manufacturer’s platform on a daily basis, revolutionizing the way in which patient monitoring can be carried out with proven added value: 38% reduction in mortality at one year and reduction in costs and rehospitalizations.

Implicity is a smart remote monitoring platform that provides cardiologists with an unparalleled access to cardiac monitors and overcomes the difficulties of telemonitoring deployment practices in hospitals. Although telemonitoring has been mandatory in medical guidelines since 2015, the adoption of telemonitoring remains marginal and is restricted to 15% of eligible patients in Europe. The Implicity platform has been designed to:

- collect, harmonize and make available in a structured form all patient data generated by any connected implanted cardiac device from the main cardiac implantable electronic device manufacturers, including access to their historical clinical data; and
- facilitate medical workflow and foster the scalability of telecardiology practice (1).

Impact

Implicity was created in 2016 and aims to improve cardiology practice and to design predictive solutions by combining state-of-the-art software technology with data science, machine learning and AI. Implicity is intended to extend the reach and efficiency of cardiac remote monitoring using innovative solutions to improve patient care. Implicity now services 80 medical centres, allowing more than 45,000 patients to be followed up worldwide. The Rythmopôle group is one of the largest centres implanting defibrillators and pacemakers in France, having implanted more than 1160 cardiac pacemakers and 280 cardiac resynchronization devices (pacemakers or defibrillators). It has now adopted the Implicity platform. The number of patients monitored remotely has increased from 250 patients in 2018 to 1600 in 2020.

References:

France

Description

VisioCyt is a newly CE-marked software solution developed by VitaDX based on white light imaging and AI. It enables diagnosis of the early stages of bladder cancer from a simple urine sample. VisioCyt relies on the standard cytological staining method, the Papanicolaou (Pap) stain, which allows cells to be observed in white light. VisioCyt algorithms are based on machine- and deep-learning approaches and can analyse every biological element on a digital urinary cytology obtained using commercial slide scanners.

VisioCyt works both for primary diagnosis and for following up patients with either a first diagnosis of bladder cancer or a recurrence. VisioCyt is intended to serve as an aid for diagnosis, meeting the needs of pathologists and urologists without altering their current practice and requiring no specific training to perform or interpret the analysis (1).

Impact

VisioCyt is able to improve the diagnostic pathway of patients with suspected bladder cancer by allowing better detection of cancerous and abnormal cells within a urine sample. It will, therefore, allow a simple adaptation of the endoscopic method for the urologist. A negative result from the VisioCyt analysis strongly reinforces the probability of an absence of cancer in the patients, while a positive result strongly suggests the presence of this pathology. This information is critical for pathologists and urologists and is much more reliable than the classical alternative. A prospective clinical trial involving 1000 patients in 14 hospitals found a sensitivity of 45% for classic cytology and 81% using VisioCyt. VisioCyt makes it possible to detect and treat bladder cancer as soon as possible, reducing its impact on patients' quality of life and increasing their expected survival rate.

References:

**Georgia**

**Description**

NCDs are the leading cause of morbidity and premature mortality in Georgia. Proper management of NCDs requires comprehensive data on diseases, their risk factors and outcomes to enable adaptation of health systems and policies towards strengthening population health strategies. For better monitoring of NCDs, various data sources can be used. These include health surveys on diseases and risk factors (e.g. the WHO STEPwise Approach to NCD Risk Factor Surveillance (STEPS) and the WHO European Childhood Obesity Surveillance Initiative (COSI)), other more traditional population-based registries and sources that monitor the marketing or purchase of food products in supermarkets. Better methods for integrated surveillance of NCDs could be supported by use of electronic health record surveillance and through new data sources, such as social media and digital trials. The three big data sources that are making potential contributions for NCD surveillance in Georgia are health organizations’ databases, virtual digital trials and real-life digital trials.

Health organizations’ databases that contain longitudinal health records and insurance claims databases allow for the identification of long-term trends, as well as sudden changes in morbidity, risk factors and healthcare delivery. In 2015 Georgia implemented a cancer registry as part of health organization database development. It forms a key population-based tool for identifying trends and developing public health approaches against cancer and has significantly improved national data availability on cancer morbidity and mortality. In 2019 the Unified Electronic System for Cancer Data Collection was launched, which combines information on cancer screening, diagnosis and treatment. The Unified System is connected to the health systems’ birth–death module and the patient’s life status is updated in real time.

**Impact**

The cancer registry system is used by all medical practitioners involved in cancer management and who offer any of the range of screening, diagnosis and treatment services for patients with cancer.

Georgia also has ongoing state screening programmes for cervical, breast and colorectal cancer. Data from the screening programmes are collected as part of the Unified System and this ensures that target beneficiaries who have screened at least once are registered in the Unified System and invited to screenings within the programmes. The Unified System includes detailed information about screenings, such as procedures and results, and it allows measurement and monitoring of important indicators to assess screening performance and outcomes and the participation of the target population.

The Unified System allows for better management of patients with cancer; after obtaining a patient’s consent, physicians can access the patient’s electronic data.

The information collected within the Unified System supports assessment of cancer prevention and management activities. In 2020, five years after the implementation of the population-based cancer registry, the five-year survival rates for different types of cancer could be assessed; these rates support the identification of weak links in the chain of cancer care and indicate suitable changes that could be made in cancer control approaches in the country. Assessment of survival rates has revealed that they are much lower in comparison with developed countries; the identification of predictive factors for low survival of cancer will allow us to develop evidence-informed approaches in cancer control strategy in the country.
Description

Diagnostic/therapeutic e-prescription protocols and integrated guidelines for a number of medical conditions. Diagnostic/therapeutic protocols have been implemented in the Greek national e-prescription platform, gradually evolving the platform into a decision support tool for medical professionals regarding a number of NCDs. Conditions included cardiovascular diseases, chronic obstructive respiratory disease, dyslipidaemia, osteoporosis, rheumatoid diseases, hypertension and diabetes. These diagnostic/therapeutic protocols are extensively used by physicians for the management, diagnosis and treatment of major NCDs through a primary care approach recognized and approved by governmental or competent authorities, and as an aid to prescribing medications, setting out a framework for evidence-informed medicine. The protocols include medication of first choice, secondary medications, alternative therapies and rare cases. A representative protocol would include general information; information on treatment steps and subconditions using appropriate risk-assessment algorithms; treatment options with therapeutic products; and information regarding medicinal products. A typical prescribing protocol would include selecting the appropriate protocol according to International Classification of Diseases (version 10) diagnoses, insertion of the relevant input parameters, selection of the medication and finalization of the prescription. The first protocols were deployed in 2013 and their number has been steadily increasing since then.

National registries for NCDs. Examples of such registries include the Registry of Childhood and Adolescence Neoplasms and the Cystic Fibrosis Patients Registry. The latter is described here as a relevant example of good practice.

The National Cystic Fibrosis Patients Registry was deployed in 2020 according to Ministerial Decision No. 4865/2020. Cystic fibrosis is an inherited disorder that causes severe damage to the lungs and other organs. It is estimated that about one in 2000–2500 children is born with the disorder in Greece, while the defective gene that causes the disorder is thought to be carried by 4–5% of the general population. The Registry records the number of patients with cystic fibrosis in Greece and is now thought to contain over 95% of these patients. The Registry enables assessment of the epidemiology of the disease, possible complications and any other relevant information of critical importance from a medical perspective. It also records patients' medication protocols and their access to innovative treatments.

Impact

The National Registry of Cystic Fibrosis has been fully operational since 2020 and has succeeded in collecting data for over 95% of Greek patients with cystic fibrosis, with the ultimate goal of optimizing provision of healthcare services for them. It has been a valuable tool in estimating the prevalence and the epidemiological characteristics of the disease; in evaluating the effectiveness of available treatment protocols; and in examining the severity and burden of disease in each individual.

The National Registry of Childhood and Adolescence Neoplasms was launched in 2021 under Ministerial Decision No. 9692/2021 to record data for children under 18 years of age with cancer. About 40% of children with cancer have been registered so far.
The therapeutic protocol for dyslipidaemia provides an example of use of a protocol to analyse the impact of therapeutic interventions. Medication expenditure was compared for a selected period of time when the dyslipidaemia protocol was available (November 2013 to November 2014) with an equal period of time when the specific protocol was not available. There was an overall reduction of 15.85% in the cost of statins in the period using the protocol. The economic crisis and subsequent public expenditure cuts slowed the rate of health expenditure growth. However, these results indicate that suitable protocols integrated in the e-prescription system and based on evidence could reduce unnecessary costs, leading to cost-containment while still ensuring the provision of high-quality health services to those who really need them.

These digital health solutions, both patient registries and therapeutic protocols, have a significant impact in the collection of comparable national data and in the provision of high-quality care services, while providing clear benefits in terms both of cost reduction and of improvement of surveillance, prevention and control for NCDs. The therapeutic protocols are constantly updated and, currently, there are 65 incorporated in the e-prescription system (related information is published on the Ministry of Health website).
Kyrgyzstan

Description

In the Kyrgyz Republic, a standardized outpatient clinic visit form is filled out (digitally and in hard copy) for each visit to an outpatient clinic.

The form contains information on the patient and the reason for the visit, including non-communicable diseases (NCD) such as hypertension, diabetes, cancer, etc. The database is formed centrally and allows for an initial analysis to be conducted at various levels (from local to national).

The database was used to conduct hypertension management analysis, with the data being exported into the SPSS statistical software. Subsequently, the analysis was used to compile digital reports. The number of registered persons with hypertension as a percentage of the population assigned to local outpatient clinics was identified. Process indicators (blood pressure, blood sugar and blood cholesterol levels were measured, and the risk of cardiovascular disease was assessed) and the degree to which target indicators had been achieved were determined. The frequency with which NCD risk factors were registered and medications prescribed were also established.

Impact

Between March and May 2018, Jill Farrington, Coordinator of Noncommunicable Conditions at the WHO Regional Office for Europe, Professor Tiina Laatikainen (National Institute for Health and Welfare, Helsinki) and Laura Inglin, a statistics and analytics specialist, led the analysis of primary hypertension management at four outpatient clinics in the city of Bishkek. Anonymized data was analyzed and opportunities for further studying the management of the two most socially significant diseases – hypertension and diabetes – were identified. In September 2018, a training workshop was held for employees of the E-Health Care Center at the Ministry of Health and representatives of tertiary health care institutions and universities, where presentations on the capabilities of analyzing outpatient clinic visit database, training in how to use the SPSS, and recommendations on improving data input were given. As a result of the workshop, the Ministry of Health of the Kyrgyz Republic formed a working group on improving hypertension management that includes members of the E-Health Care Center (DHC), the National Center of Cardiology and Therapy (NCCT), the Kyrgyz-Russian Slavic University (KRSU), and the Mandatory Health Insurance Fund (MHIF).

The sustainable partnership between various concerned parties allowed made it possible to analyze data for regions (Issyk-Kul and Naryn) and cities (Osh and Bishkek) and highlighted the main problems of the low detection rates and poor management of hypertension. At the next stage, training sessions were held for primary health care employees teaching them on data encoding and new report forms were developed (automated output for some key data). National experts (at NCCT and KRSU) launched a pilot project for the improved model in the Kemin District and the city of Bishkek. For the first time, training was offered to MHIF experts, including regional experts, jointly with the MHIF, and analysis recommendations were introduced into the health care institution assessment card. Involving a nursing care expert in the group made it possible to expand the role of nurses in improving hypertension management, and hypertensive crisis protocols for medical staff (doctors and nurses) were developed. A national-level roundtable with feedback from the regions was held. Algorithms and standards for operational procedures were developed.
A project for the design, development, testing, commissioning, delivery, operation and maintenance of a remote patient monitoring and call centre service for preventive care was initiated in 2019 by the Ministry for Health through an innovative procurement mechanism entitled Innovation Partnership. The aim of the project is to offer a new service to people with certain chronic conditions where their vital parameters could be monitored remotely. The objectives of the project are threefold:

- allow the real-time monitoring of vital signs, early detection of clinical deterioration and timely intervention to prevent poor outcomes;
- provide more information to health-care professionals when patients attend a follow-up clinic; and
- help to prevent complications before they occur, improving the quality of life of people who otherwise would require repeated hospital visits.

Initially this service was piloted among children with type 1 diabetes. Participants were given continuous glucose monitoring devices that could connect wirelessly to both their own and their parents’ smartphones, as well as to a designated call centre and to medical staff. Children and their parents could be alerted in real time if there were any symptoms of hypo- or hyperglycaemia; the call centre could also receive reports and notify the parents. Weekly reports were sent to the medical teams monitoring these patients, who could use the reports in outpatient appointments to tailor insulin doses to each individual’s glycaemic profile based on their lifestyles, habits, activities and nutrition.

**Impact**

The six-month pilot project in 2021 included the nationwide population of children under 16 years of age with type 1 diabetes (about 160 children). The medical team observed that the long-term glycaemic control of their patients (as measured by glycosylated haemoglobin (HbA1c)) improved by 1–3 percentage points in all patients through the use of glucose monitoring devices. The system also improved the quality of life of the children and their parents, including

- less frequent painful pricking of the child’s fingertips to check blood glucose;
- more accurate information about the child’s glycaemic control day and night;
- better understanding by the young patients about how their diabetes behaved in response to meals and activities, which improved their knowledge about their own diabetes and improved their compliance with medical management; and
- greatly increased peace of mind for parents/caregivers when their children were at school or asleep because of the use of alarms and having a call centre set up for any questions or urgent needs.
The Medical Research Agency (MRA) is a state agency responsible for development of medical and health science research to support creation of an innovative health-care system. The MRA is responsible for the implementation of the Governmental Plan for the Development of the Biomedical Sector for 2021–2030. Based on the Plan, the MRA is focusing on supporting the development of bioinformatics tools and the use of innovative solutions in medical biotechnology and bioengineering for health care, from prevention through diagnosis to treatment. These developments should shorten the treatment path for patients, increase efficacy and lower system costs. The MRA will finance projects in AI and big data in health care in 2021.

The Internet of things describes objects with embedded sensors, processing ability, software and other technologies to enable connection and data exchange with other devices and systems using the Internet or other communications networks. Interconnectability of devices is the foundation of modern medical technology. It enables the processing of large datasets in real time and can provide fast responses to the needs of patients and their caregivers. This approach enables the collection and analysis of datasets and facilitates the development of digital biomarkers, which are a key technology in preventive care and early diagnosis.

The importance of remote patient monitoring has increased significantly in recent years, and particularly during the COVID-19 pandemic. Non-invasive remote monitoring devices are becoming more available and increasing in capability enabling aspects of care to be provided in a patient’s home. Telemedicine interlinks medical care between a patient’s home and their health-care providers and is likely to develop at a particularly rapid pace in primary health care and for clinical trials.

Further developments of digital medical devices will be matched by collection of patient information that is currently dispersed into central databases to ensure it is available at every stage of a patient’s care and at every health service facility. This involves building digital analytics platforms that collect patient’s health data and analyse them using AI algorithms, including machine learning. Currently, the main challenge is to achieve rapid scalability in this area to ensure better access to health care, more effective prophylaxis, better coordination of diagnostics and better patient treatment outcomes, thus contributing to lower health-care costs.

The use of medical biotechnology will support more precise treatment, especially for cancer, immune disorders and cardiovascular diseases, which are responsible for a significant proportion of premature deaths in industrialized countries. Moreover, SARS-CoV-2 infection is expected to have long-term negative effects on the health of many of those infected. It will be necessary to further develop devices and solutions that will support the treatment and rehabilitation of COVID-19 survivors and diminish the causes of long-COVID. In addition to these direct effects of the COVID-19 pandemic, there will also be indirect negative effects on health from the wider socioeconomic impacts.
Since 2019, the number of patients receiving radiotherapy has increased in Slovakia. Before initiating 80–90% of radiotherapeutic treatments, contouring of organs at risk and determination of clinical target volumes are required using computed tomography. The results then form the basis for development of a treatment plan. As this is a time-consuming process, the Oncology Institute in eastern Slovakia piloted in 2020 a tool to support automated contouring of organs at risk for radiotherapy planning.

In general, up to 60% of all patients with cancer need radiotherapy during the course of their disease. The contour boundaries of organs at risk and the clinical target volumes are guided by international guidelines in most clinical areas, which must be followed for each patient. Each computed tomography slice requires manual contouring, which can represent tens to hundreds of steps per patient and, on average, takes 10–30 minutes per patient, depending on the complexity of the particular situation. This activity is very laborious and monotonous and can make up 30–50% of the workload of a radiation oncologist. Not only does this unnecessarily waste the individual potential of specialists, but it also reduces the attractiveness of this specialty. Most importantly, it can also prolong waiting times for patients with cancer requiring radiotherapy.

**Impact**

The tool deployed at the Oncology Institute uses deep learning technology to provide AI-generated contours within seconds. In just the first two months of using this tool, the average time between performing computed tomography and planning radiotherapy was reduced by almost two days, which means that patients start their radiation therapy course faster.
Description

The Primary Care Clinical Database (BDCAP: Base de Datos Clínicos de Atención Primaria) collects clinical information from the medical records of 4.8 million people having an individual health card (those entitled to health care through the National Health System, which is close to the entire Spanish population). This gives a sample of around 10% of the population. This database allows the following to be identified:

- estimates of incidence and prevalence of diseases, included NCDs, classified with the International Classification of Primary Care version 2;
- comorbidity associated with NCDs;
- the degree of control of certain parameters related to risk factors for NCDs in both the general population and in people diagnosed with any NCD (e.g. blood pressure, glycated haemoglobin, body mass index, international normalized ratio, glomerular filtration index, haemoglobin, total cholesterol and low density lipoprotein cholesterol);
- indicators of good practices related to care provided according to recommendations (e.g. spirometry, electrocardiography, screening for cervical cancer, faecal occult blood and colonoscopy); and
- drugs prescribed, consultations in secondary or tertiary care and consumption of other resources (visits, imaging or laboratory procedures) (1).

Impact

The Primary Care Clinical Database was commenced in 2011 and progressively increased its coverage until completion in 2016. Data are available to all citizens free of charge on the Ministry of Health’s webpage in different formats, including reports and a data query tool. The data query tool can be used in its standard format or as a snapshot of the current state of affairs for planning, health and clinical management, and for provision of data to international health databases. Microdata are available for researchers on request (2).

References:


The Elsa Science app for rheumatism. The app was developed in collaboration with the Karolinska Institute to address the needs of patients with chronic health conditions who wanted to share their experiences, gain knowledge about their condition and take an active part in their health care. Using a powerful and science-based motivational and educational support system, the platform joins individuals, families, patient organizations, care providers, manufacturers and researchers to achieve a greater common good: to learn from each other and to encourage patients with chronic conditions to enjoy a higher quality of life.

The Elsa Science app was developed to support patients with rheumatoid arthritis. Users can follow up symptoms, lifestyle habits and medications to better understand how these issues are interrelated. Using a tailored plan, the app guides the user through their daily lives. Elsa Science has developed software for health programmes based on collaborations with patients, health-care workers and researchers. These programmes, which include cognitive behavioural therapy interventions, support the user with technology for self-care and behavioural change to help in addressing the disease. The user downloads the app, registers his or her parameters and can follow changes over time. Users can also attend educational programmes in the app, for example on how lifestyle habits and physical activity can improve their health. Data can be shared with health-care providers, the patient’s own rheumatology specialist or the health clinic. Examples of categories where data can be added are general health, pain, tiredness, soreness and swelling, medications, well-being, physical activity and weight.

The blood pressure doctor app. The app provides a patient with access to their own specialist doctor and nurse, 24/7, using their mobile phone. The patient receives a personal blood pressure monitor, conducts an extensive health examination with several blood tests and responds to a survey covering a number of health parameters. The doctor and patient develop a treatment plan together, including possible adjustments of medicines, lifestyle interventions and goals. The app, which is easy to use, gives clear feedback to the user, allowing the patient to monitor their parameters and measurements, which are shared with the doctor and nurse. This allows the patient to take an active part in the follow-up of their care every three months, or more often if needed, which complements the annual primary care follow-up. Care is more efficiently delivered, and the risk of complications reduced, including monitoring of other diseases.

Atrial fibrillation. Heart diseases, such as ischaemic heart disease or atrial fibrillation, are among the most common causes of death in Sweden. Electrocardiograph measures, heart sound and pulse can be captured in only 60 seconds using a small device, Coala, and a smartphone. The user does not need adhesive electrodes, electrical wiring or extensive technical devices. Smart medical algorithms analyse the results instantly and provide the user with a response within seconds, straight to their smartphone. All measurements are digitally stored, and the user can easily share the results with their doctor.

The heart fibrillation control service provides home loan of the Coala heart monitor, a digital arrhythmia examination and a written opinion from a cardiologist on the results. This digital arrhythmia assessment does not require a physical visit or long waiting times for an examination or to get the results from a cardiologist. This tool is for suited to people who wish to familiarize themselves with the Coala heart monitor and who want an opinion from a heart specialist. The Coala device can be bought over the counter or it can be prescribed by a medical doctor.

The Previct Alcohol platform. This is a three-way digital support tool, comprising an app, a wireless alcohol monitor in a handy pocket format and a treatment platform. It is available in several European countries. The user blows into their alcohol monitor every day. The monitor connects to the user’s smart phone and sends the result to the doctor treating the patient. Each time the patient blows into the device, it not only registers whether the patient is sober or not but also analyses the patient’s overall situation.
Using AI, the results are analysed to predict relapses and provide support via the app, allowing the patient to address negative behavioural patterns and create positive habits. The patient is thus supported to make the right choices, knowing that a new test is only a few hours away. In collaboration with the care provider, the patient develops a care plan with clear goals and targets. Every day, the patient blows into the monitor and takes a so-called selfie. The results are instantly sent to the caregiver and the patient can also choose whether family members will be allowed to see the results. The results are used in the dialogue with the patient. In the app, the patient can perform a number of daily tasks helping to break negative patterns and intended to create new positive ones. Previct is designed to be a link between the individual and the caregiver and to be a support when the patient most needs it. Daily questions on well-being, how to stay sober or how to drink less guide the patient to improved self-care. If the urge to drink becomes too great, the app also has a help button which puts the patient in contact with their caregiver or chosen next of kin (1), (2), (3), (4).

**Impact**

According to a survey by the Swedish Internet Foundation in 2019, 53% of the Swedish population over the age of 16 years uses digital tools for health, to schedule an appointment, follow their referrals and monitor their test results. Using digital tools is more common in cities (56%) than in rural areas (47%).

AI solutions are mostly used for anamnesis, diagnosis and decision-making support, and in radiology, cardiology, dermatology, digital pathology, ophthalmology, and gastroenterology and laboratory analysis. AI is also used for monitoring and telemedicine, such as remote monitoring of patients with heart failure; digital health at home; prevention of falling using sensors; and medicine robots that remind patients to take their medication and log each use. Generally, quality of care is improved by using collaboration between humans and machine. Both public and private care providers argue that the quality of care is improved by using digital tools to process large amounts of data.

**References:**


Joint work was carried out with the General Directorate of Health Information Systems to create a system for regular and detailed monitoring, reporting and follow-up of individuals with chronic diseases. Software was developed for a digital Disease Management Platform for NCDs that covered hypertension, diabetes, obesity and cardiovascular risk assessment. The software was tested with a pilot application and questions raised by users during this period were answered in online meetings, by e-mail and by the software support team. As the Platform was created with a modular structure, additional sections can be added over time.

Family physicians and specialists in hospitals can access the system using a link in their software system or from a common access point (1). The Platform allows family physicians to manage information, while specialists can view information or can be identified as physicians who can manage information if required.

The Platform provides lists of patients who need screening and healthy individuals. People who have been diagnosed previously and who have a prescription recorded are included in the patient list. Those who do not have a diagnosis registered and those who have a diagnosis but do not have a prescription recorded are on the screening list.

Family physicians record, monitor and follow up on hypertensive, diabetic and cardiovascular risk assessments, obesity and geriatric assessment of their patients. The physician can take electronic notes while seeing a patient and directed them through the Platform to specialist care, physiotherapy or to a dietician in a healthy living centre. The software also guides the physician to plan treatment for the patient, suggest lifestyle changes and set treatment goals. With regular follow-up, it can also be identified if a patient has reached the determined treatment goals.

The geriatric assessment for people over 65 years of age in primary health care evaluates general health status and daily activities using set scales (e.g. functional independence assessment and mental status assessment) and provides ongoing monitoring.

Separate screens have been designed for physicians and nurses working in the family health centres in both chronic disease screening and follow-up modules and for the geriatric assessment of the elderly module. The information recorded by the physician in one module is automatically completed on the relevant screens in the other modules and the same information is not requested from the physician again. It is easy to switch between modules. Flow charts of the screens have been created using guideline standards, and recommendations are provided based on the information recorded by the physician to enable management according to the standards.
Impact

Since 1 July 2021, when there was a regulatory change for salary payments for family physicians, they receive compensation for performance of additional work for screening and follow-up using the Platform. Although fewer patients have seen their family physician for routine matters during the COVID-19 pandemic, 18 688 unique user systems were in operation at 1 July 2021; 5 million screenings or follow-up procedures for chronic conditions were carried out for 1.5 million people, including blood pressure screening for 1 million people with ongoing hypertension monitoring for 500 000, and obesity screening for 1.2 million people. A six-month assessment of the impact on health outcomes is planned for the end of 2021.

The Platform integrates individual modules and 14 different software systems currently utilized by the Ministry of Health through its architectural structure.

However, physicians had varying reactions to the new system. Those who stated that the system was difficult to use often expressed this idea without having used the system. When using new software and new screens for the first time, it is expected that there will be an adaptation period; however, those who tried the system a few times and became familiar with the screens reported that the system was user-friendly. It is predicted that prejudices based on the changes in the working methods for family physicians will be eliminated with time.

References:

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

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Austria
Azerbaijan
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Bosnia and Herzegovina
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Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
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Ukraine
United Kingdom
Uzbekistan