

Health challenges, eHealth solutions

1. Introduction

The purpose of this document is two-fold: 1) identify eHealth solutions to address the challenges facing the healthcare sector system in Slovakia, and 2) propose improvements to national healthcare policy, strategy, and eHealth strategic planning. Hopefully, this document can also serve as a source of information and ideas for other EU countries, since most of the healthcare challenges identified in this document should be common to most, if not all, EU countries.

Reviewers of this document are encouraged and welcome to provide feedback to help us improve the document, which intended to be presented to both DG SANCO and DG INFSO groups in order to start a more detailed discussion on how to manage healthcare challenges using eHealth solutions.

2. Healthcare Challenges

1. *Growing gap between healthcare costs combined with needs of citizens verses the financial resources available for healthcare delivery to citizens:*
 - a. Healthcare needs of citizens are growing more rapidly each year, due to the growing number of older citizens, the increased number of chronic diseases, the new diagnostic and therapy methods (some are very expensive), and the increasing expectations of citizens for the best healthcare.
 - b. Costs increases are due to more expensive and innovative drugs, new diagnostic procedures and therapy forms (such as genomics, proteomics, and cellular therapy, i.e. personalized medicine).
 - c. Limits on income increases based on fiscal limitations, demographic crisis, shrinking working population, as well as the reluctance of citizens to pay higher taxes.
2. *Reduced capacity of doctors, nurses and other skilled healthcare professional*
 - a. Many doctors are already at or very near retirement age and the average age of healthcare professionals is only increasing.
 - b. There is a significant lack of doctors in many specializations.
 - c. There is a lack of nurses due to their leaving for better paying jobs.
 - d. There is a significant decrease in the study of medicine, and many students who study at Czech universities do not complete their course work to obtain their degree.

- e. There is a lack of doctors across the EU which provides the opportunity for Slovakian doctors to get jobs in the Czech Republic, Austria, Germany and other EU countries.
- f. Inadequate salaries lead to dissatisfaction among healthcare professionals. The “First Aid Health Care” is a good example.
- g. There is a 10-year delay from the time that a student is accepted into a medical program until they are qualified as doctor for medical practice.

3. Inefficient use of costly healthcare resources

- a. Repeat and extended hospitalizations, as well as unnecessary pharmaceutical consumption while being hospitalized.
- b. Duplicate or redundant examinations and procedures caused by lack of coordination between doctors and hospitals.
- c. Many healthcare providers have higher fixed costs due to their use of older facilities which can have higher energy and maintenance costs.
- d. Performance KPIs and medical guidelines are not up-to-date but are used as the standard for healthcare providers efficiency assessments.
- e. Limited efficiency in using one-shot sources given by EU funds.

4. Drug Policy causes drug costs to be higher than in other EU countries

- a. Regulated margins need to be used for price references.
- b. Representatives from pharmaceutical companies may influence doctors to issue unnecessary prescriptions. This phenomenon has not been fully understood and analyzed yet.
- c. Inefficient prescriptions management of polymorbid patients who may be prescribed ten or more different drugs which have contradicting and incompatible interactions.
- d. No cause-and-effect feedback mechanism between prescriptions and diagnoses.
- e. A large number of pharmacies (three times higher than in Denmark when comparing to the number of citizens) encourage the consumption of drugs while at the same time do not encourage decreases in the profit margin of drugs.

5. *eHealth Implementation*

- a. Slovakia ranks near the bottom of EU countries in terms of the priority and importance of eHealth (see table at the end of the document); so, it is important to speed-up the implementation of eHealth (specifically the 2nd wave of eHealth implementation, which is now ready for public procurement and already has finances allocated within EU funds).
- b. Find best strategies how to inform decision makers and policy makers for the Ministry of Health, Ministry of Finance, Office of the Government, professional chambers, Public Health Authority, Healthcare Surveillance Authority, Medical Faculties, and other key groups and organizations about the urgency and importance of implementing eHealth.
- c. Ensure that there is adequate funding within the EU funds for the 3rd wave of eHealth implementation. This should be of particular importance to the EU funds since their concerns primarily center on the improvement of healthcare for citizens as well as making a positive economic impact through healthcare programs.
- d. Ensure funding of eHealth through state and local budgets – even in the current situation of fiscal crisis – since the savings potential from eHealth is 5% to 10% of health expenses.
- e. Ensure the cooperation between Health Insurance companies, State Institute for Drug Control, Healthcare Surveillance Authority in order to have a common and consistent Master data repository for eHealth applications.
- f. Cooperate more closely on eHealth projects across the EU in order to ensure the compatibility between Slovak eHealth solutions and pan-European solutions (e.g. epSOS).
- g. Define eHealth priorities in terms of health and economic benefits.

6. *EU and Healthcare Provisioning*

- a. EU initiative to create pan-European partnership for Health Care Provision which brings both potential risks as well as opportunities.
- b. Increased number of Slovak citizens are seeking and obtaining healthcare abroad which may contribute or trigger financial collapse of public health insurance due to higher prices caused by fewer people paying into the insurance premium pool.
- c. Citizens of other member states using the Slovakian healthcare system may cause financial burdens caused by lower price assessments as defined by the current performance catalogue and state requirements.
- d. Language barriers and lack of semantic interoperability may create barriers for a pan-European partnership for healthcare provisioning.

7. *Healthcare Provisioning Disparity*

- a. Inferior healthcare provisioning of smaller urban and rural hospitals as compared with larger urban hospitals. The difference is primarily due to the quality and availability of medical resources and personnel.
- b. Doctors' have non-uniform skills and training due to the lack of well defined methods and standards.
- c. Health records are not uniform and consistent due to lack of quality control and standards.
- d. Poor availability of doctors with certain specialization.

8. *Hospital diseases*

- a. Hospital diseases are one of the sources for increased treatment costs; however, the actual scope of this issue is not yet defined for Slovakia. (E.g. in U.S.A. sepsis and staphylococcus aureus causes more than 50.000 deaths).
- b. The rise of highly antibiotic-resistant pathogens in hospitals leads to the use of new, expensive antibiotics, which can further exacerbate the problem by producing even more antibiotic-resistant pathogens.
- c. Economical losses due to longer hospitalizations of productive citizen.

9. *Pandemics and biohazards*

- a. An influenza virus HxNx (swine flu, but mainly avian influenzas with 60% mortality) represents serious risk for the Slovak population at large.
- b. False alarms and unwarranted panics (e.g. 2010 alarm from the WHO and pharmaceutical companies concerning H₁N₁), can lead to the underestimation of pandemics which have much higher mortality levels.
- c. New diseases like Ebola or legionnaire's disease could reappear, and mutations may lead to a new pandemic, e.g. AIDS.
- d. Genetically modified or artificially created organisms (e.g. Synthetia created by C. Venter's organization) may become a health risk.
- e. Bioterrorism is of course a healthcare risk.
- f. There is a general lack of awareness for these risks in Slovak.

10. Public Health and the need for improvement

- a. Even though, Public Health plays a key role in the overall direction and definition of national healthcare management; in Slovakia, the public healthcare system is still under the classification of “hygiene stations”, thus grossly under financed.
- b. The EU and WHO are promoting the need to change to a patient-centric approach.
- c. A key role of the public healthcare system should be to change the public health insurance system in order to adapt to the increase in diseases.

11. New Health policy

- a. The government health policy is in many ways not so good as in more advanced EU countries.
- b. KPIs (Key Performance Indicators) need to be established. Some of the most important KPI's are QALYs (Quality life years) and DALYs (Disability Adjustment Life Years).
- c. New policies should be based on real EHR for citizens, on healthcare consumption, and on healthcare providers data.
- d. Policy should clearly define a vision, strategic targets, priorities and methods to achieve defined targets, as well as regulation tools and the role of state.
- e. Policy needs to include national prevention programs with clearly define and measure benefits.
- f. Specific challenges for policy are coming from environmental impacts – allergens, chemical agents and hormonal environment pollution.
- g. Need to have adequate administrative and technical management of Public Health Authority and Regional Public Health Authorities.

12. Administrative load for health professionals and citizens

- a. Doctors and nurses have very large administration loads which translate into large costs and inefficient use of doctors and nurses. This administration time is better spent with patients building closer relationships to educate the patient in order to promote efficient and safe self-care.
- b. One particular problem area is the re-entering of demographic and personal data at each patient visit. Also, sharing health documentation is a significant problem.
- c. Inconsistent statistical reporting to the NHIC and national registries causes a distorted view of the current healthcare situation as well as misinforms the actions taken to improve healthcare.

- d. Paper bookings lead to unnecessary visits to general practitioners, and decrease the efficiency of GPs.
- e. Annual accounting reports of health insurance causes unnecessary duplications for both citizens and business.

13. Genomics

- a. Genomics is one of the most important aspects of personalized medicine which has a significant potential health benefit.
- b. A legislation framework is needed in order to use the genomic information of citizens.
- c. The very serious ethical questions related to genomics need to be discussed and resolved.
- d. Need to determine how to implement genomics into prevention, diagnostics and therapy for a new catalogue of healthcare activities.

14. Waiting Lists

- a. Waiting lists are a key performance indicator for improvement of healthcare.
- b. Transparency of waiting-list management is an important factor for increasing confidence in healthcare and can help reduce corruption.
- c. Decreased waiting times is an important factor for the improvement of healthcare quality as well as the economic savings gained from timely treatment.

15. General Practitioners

- a. It is important to deeply analyze benefits from regionalization.
- b. In new paradigm it is important to strengthen GPs position not only in patients time plans management but also in prevention and healthy life style.
- c. It is important to analyze and redefine financial value of capitations.

16. Ethic questions

- a. Modern medicine introduces many new ethical questions which can split communities into groups that are in favor of more modern medical practices and technology, and groups that are opposed. Need to encourage and enable discussion across entire community facilitated by healthcare professionals.

- b. Serious issues exist in the use of stem cells for research and therapy, especially embryonic stem cells.
- c. As mentioned in the section above on "Genomics", usage of genomic information can raise many serious ethical questions.
- d. Assisted reproduction along with genetic testing can open a Pandora's box of eugenics issues.
- e. Euthanasia has serious ethical and moral impacts as well; the same is true for palliative care which is the part of healthcare plans that address the terminal stages of life.
- f. Abortions are one of the most discussed questions with antagonistic solutions of supporters and resistant's value systems.
- g. Increasing numbers of patients with chronic diseases are seeking treatment outside of the existing healthcare system and outside standard medical practices creating the risk of misuse by providers of complementary and alternative medicine (CAM). Also, patients outside the healthcare system, may become invisible in terms of a health census, and in terms of tracking a patient's history and medical information.
- h. CAM methods may have a positive impact; and, albeit only proven empirically, they are becoming more and more popular primarily due to the Internet. These methods (e.g. acupuncture, yoga, traditional Chinese medicine, etc.) may even complement classical healthcare and convalescent care; however, by operating outside the healthcare system, healthcare professionals are not able to advise patients on appropriate CAM methods, thus unnecessarily putting patients at risk.

17. Corruption

- a. Corruption is a serious problem for healthcare, and is manifested in two specific areas: healthcare provisioning and procurement of drugs, medical devices, services.
- b. Corruption can be decreased through transparency, such as having patients authorize healthcare provisioning electronically.
- c. Corruption can also be decreased through the application of surveillance tools used for auditing and forensic analysis.

18. Cooperation between Healthcare and Social Care

- a. The boundaries between social care and healthcare are not clearly defined, so healthcare facilities are often misused for purposes of social care such as for the elderly and people who cannot be moved. This misuse can reduce the overall availability of healthcare resources.
- b. Ensure cooperation between social care and healthcare, including ADOS and disabled-citizen services.

19. Economic Challenges

- a. Profit regulation of health insurance companies, as well as for drug policy (digressive margin, price referencing).
- b. Imbalanced economic (cost and profit) assessment between healthcare specializations and services. For example, stomatology is profitable, but Intensive Care Units are not profitable).
- c. Arbitration of lawsuits can negatively impact health insurance company's profits and thus reduce their viability as a business.
- d. Existing health insurance companies and health care providers' liabilities with the risk of executions and arbitrations.
- e. Some required hospital activities are inefficient, more profitable activities are out of hospitals (laboratories, 112 rescue services).
- f. Inefficient use of hospital beds (as compared to the EU) increases fixed costs.
- g. Discrepancy between the quality of healthcare provisioning and the economic assessment by healthcare providers.
- h. Contractual obligations of health insurance companies to healthcare providers do not accommodate technical equipment renewal/update.
- i. To solve the theme of faculty hospitals liability decrease as the end stations taking care of the most complicated and healthcare expensive patients.
- j. To manage patients effectively - based on correct setup of health providing catalogue and guidelines.
- k. To find right setup for financially demanding health care – payment system, insurance system, right mix of public and private health insurance.
- l. Assess arbitration liabilities of hospitals, from malpractice law suits naming doctors.
- m. Resource efficiency data should be obtainable through eHealth Records (EHR).
- n. Silver economy – with requirements to special healthcare for elder people, massive tele-services.
- o. Efflux of financial resources paid by patients and their relatives for healthcare in the area of chronic civilization diseases without efficient causal healthcare to grey zone of CAM providers with no control and responsibility.

20. Publicity and information

Issues concerning communications to citizens and healthcare professionals:

- a. Use simple language to inform citizens about the challenges facing the healthcare system as well as about potential solutions.
- b. Use PR channels to educate the public on preventative and proactive healthcare programs, as well as educate the public on self-healthcare and healthcare measures that they can apply to their relatives.
- c. Immediately dispatch the message that without changes to the existing healthcare system, the current public health insurance system will not be viable.
- d. To prepare professional documents for all important healthcare related decisions and to give them to professionals and media.
- e. Include healthcare professionals in the writing of new government health policy.

21. Nanotechnologies

- a. One the scientific horizon is the use of nanotechnology for medical practice, such as using nanobots to tumour removal, cleaning vessels, closing wounds, distributing active substances throughout the body.
- b. Nano-technologies also lead to many legislative, ethical and security questions. Nano-technologies have the potential of being inserted into a person again their will or without their knowledge.
- c. Costs of using nano-technologies in medicine may significantly increase disparity between citizens who can afford the use of such technology and citizen who cannot afford it.

22. Social-psychological effects of modern age

- a. Internet, social networks, computer games, mobile phones, and electronic media in general can create virtual worlds and create dependencies that change our reality perception. This electronic world can cause social, psychological and mental effects, as well as cause changes in social interaction and behavior. The consequences of such changes to society and mental health can only be speculated.
- b. Extended time spent in this virtual world can consume significant time, and this is typically at the expense of sleep and exercise which limits social contact.
- c. Use of electronic media starting at childhood can distort reality via ads, idealization, shifting values and interests that may lead not only to psychological but also to physical impacts (e.g. anorectic models may be viewed as ideal).

- d. Still more enhanced using of free and even prescript drugs affecting mentality leads to doubts about long term impacts to society.
- e. Massive society frustrations are caused mainly by breaking traditional values (family, ethics, morality), uncertainty of stratum intermedium on the job market, loss of potential to real influence of politics and social activities, economical crises, global risks. These frustrations are visible on psycho-social status of many society members.
- f. Healthcare depersonalisation is an issue as modern hospitals tend to operate like factories. For example, hospitals can be very large facilities, number of clinics, healthcare workers and patients may remain anonymous to each other, there may be many people with interact with a single patient in a short period of time, there are very controlled time allotments for patients to interact with doctors and nurses. Increasing amount of information required for anamnesis (Hx, medical history) is decreasing the time for personal contact between patient and doctor.
- g. New neuroscience technology (such as electron positron tomography for detailed monitoring of electrical brain activities via electrodes) introduces the potential for new psychiatric practice, and may lead to ethical, legislative, juridical and medical issues.
- h. Increased popularity of synthetic stimulants along with designer drugs produced with more or less sophisticated chemical technologies with the only aim: to synthesize the substance not existing in any list of controlled substances but having stimulation and / or euphoric effects. As the current example the substance methadone may be taken. This substance is in many countries listed legally as fertilizer for bonsai, but in the area of nightlife it is competing with illegal stimulants like cocaine and methamphetamine. There are very limited information about overdose and long-term effects to human organism.

23. Change of relationship paradigm between healthcare professional and patient

- a. In the current relationship between the patient and the healthcare professional, the healthcare professional has exclusive authority; and, the patient has complete trust in the healthcare professional. The change in the relationship paradigm between the healthcare professional and the patient means that the healthcare professional and the patient work together as trusted partners to provide the best possible healthcare for the patient.
- b. This change in the relationship paradigm needs to be part of the education process for new doctors and nurses, as well as for doctors and nurses who are currently practicing.
- c. Patients unknowingly withhold information from doctors. This can happen because a patient does not realize that the information may be useful or even necessary for the doctor to provide the best healthcare; or, the patient simply does not trust the doctor.
- d. Free medical information made available to patients via the Internet or other means may be from unauthorized or illegitimate sources; and, this information may also be incorrect and incomplete which can misguide patients into taking inappropriate actions in terms of seeking (or not seeking) medical advice or attention. Patients usually do not have the knowledge or experience to judge the quality or legitimacy of this kind of medical

information. Generally, there is a lack of accurate and complete medical information that has actually been validated by an authorized professional, and that is in a form that can be understood by a patient.

- e. The lack of education for patients to inform them on the importance of preventive screening and when it is appropriate to seek modern and more expensive diagnostics and therapy can lead to increased healthcare costs.
- f. Through the media and various other means, the population may have an unrealistic and inflated expectation of modern medicine which can lead to complaints made to the Healthcare Surveillance Authority as well as lawsuits filed when medical therapies do not meet these expectations and thus are deemed as failures, mistakes, or negligence on the part of doctors or the hosting medical facilities. This situation can lead to increased costs of healthcare provider's malpractice insurance (e.g. in the USA these costs are enormous) which in turn increases the overall cost of healthcare.
- g. Some CAM providers actively discourage patients from using the existing healthcare system, and this may cause a sick patient's (such as an oncology patient or any other type of patient for that matter) health to become worse much faster; so, when a patient re-enters the healthcare system, the costs are now much higher and the prognosis is likely to be more negative than if that patient had simply stayed within the existing healthcare system.

24. Unforeseen impacts of modern medical success to society

- a. Success of modern medicine not only has ethical impacts, it can have economic and social impacts as well.
- b. Modern medicine has been able to increase the average age of the population, and this is causing unanticipated social impacts both psychological and economic.
- c. Modern medicine can often prolong the dying process which can mean additional and unnecessary suffering for a terminal patient. Prolonging this process may be detrimental to the patient and can also have a very negative economic impact. There are also serious ethical issues. For example, how should it be determined who and when to apply extreme medical palliative care. What if a patient rejects palliative care.
- d. As people more and more believe in the "endless" capabilities of medical science, the more likely they are to stop applying healthcare common sense and preventive measures. Also, they are less likely to heed the real and present health risks of smoking, alcohol, poor nutrition, high stress, insufficient sleep, etc.

25. Health Impacts of living and working environments

- a. Although, the responsibility for the living and working environments of the population is beyond the scope of the Ministry of Health SR; there still needs to be an awareness and understanding of the health impacts of these environments in order to have the necessary healthcare provisioning in place.
- b. One example of how the environment can influence a person's health, just consider the massive use of hormones – human hormone look-alike derivatives for contraception, and

also hormones use for cattle and agriculture. The chemical industry will often ignore the environmental impacts of these types of chemicals finding their way into water supplies and into the soil, etc. Long term health impacts of these chemicals are still not fully known; however, there are several, definitive, extremely negative, known impacts to living organisms.

- c. Increasing numbers of couples are not able to conceive in a natural way. This is an alarming statistic and may be caused by hormonal pollution, chemical pollution, personal life style, decreased sperm count, etc. This situation leads to an increased need for costly assisted reproduction which may open the possibility of eugenics issues as well as legislative and ethical challenges.
- d. Other areas of environmental pollution which can have negative health impacts are:
Chemicals used in manufacturing:
 - Ø In the air, soil and water,
 - Ø In foodstuff (e.g. vitamin E additives),
 - Ø In the home (e.g. washing, cleaning, etc.)
 - Ø In the work environment.

Allergens: One result of environmental pollution is the increased number of the allergies – 50% of the total population are expected to be effected in 2020.

- Ø Electromagnetic smog
- Ø Information overflows
- Ø Nano particles
- e. Global climate change can factors that are related to health (e.g. sudden shifts in temperature, the spread of infection diseases shifting in direction, insufficient clear water, etc.).
- f. High stress levels at work can have a negative impact on a person's physical state and immune system.
- g. Many jobs are sedentary and do not require any significant physical movement (e.g. work with computer), which can have very negative impact on a person's health.

26. Impact of the economic and social factors

- a. Groups with the lowest incomes may not be able to afford healthcare services (treatments, pharmaceuticals, etc.). This situation may delay a person from seeking healthcare, which can actually end-up costing more to the person as well as costing more for the healthcare system since very expensive emergency services may be required by the time that the person does seek treatment.
- b. Some social groups (e.g. gypsy villages) are outside the healthcare system and do not have access to preventive healthcare information – bad self-care, bad hygiene, routine vaccinations, etc.
- c. High levels of unemployment and fears of losing a job may cause people to simulate illness. This situation is particularly bad for older members of the population, who may

experience a more rapid deterioration of health and the corresponding increase in healthcare costs.

- d. Social pressures and fashion trends (e.g. improperly fitted shoes, dress, anorectic models, desire for physical perfection, obsessions with looking younger, and a stigma of being old) can have a very negative impact on personal health as well as costs incurred by the healthcare system.
- e. Economic conditions can pressure women to postpone childbirth well past an optimum child bearing age thus significantly increasing genetic risks.

3. Potential eHealth Support for solving Health Care Challenges

1. *Growing gap between healthcare costs combined with needs of citizens verses the financial resources available for healthcare delivery to citizens:*

✚ An efficient and effective eHealth implementation may be able to decrease healthcare costs by 5% to 10% each year, as reported in the cost-benefit-analysis of actual successful eHealth projects within the EU. This cost savings nearly equates to our healthcare yearly deficit in Slovak healthcare.

✚ The primary tools for decreasing costs are:

- Electronic prescription (or ePrescription) that includes an analytical system for monitoring efficiency of a medication as well as determining if a person is even eligible for a particular medication.
- Healthcare provisioning authorized by citizens in order to decrease fictitious reporting.
- Use of electronic health records to measure performance and efficiency for health insurance companies, the Healthcare Surveillance Authority and the Ministry of Health.
- Monitor system to track healthcare needs and consumption.
- Use ICT to decrease healthcare provisioning costs and to link healthcare provider systems at the national level.
- Support national healthcare preventive programs through electronic media, especially through a National Health Portal.

2. *Healthcare Personnel (doctors, nurses) Efficiency*

✚ Increase doctor/nurse efficiency using electronic scheduling and time tracking.

✚ Increased doctor/nurse efficiency by eliminating administration redundancies (e.g. entering the same demographic data multiple times – this data will be maintained by electronic Health Records).

- ✚ Increased speed of health information entry and access through the use of ICT, e.g. drug interactions, patient's medical history, patient's medical summary, lab results, etc.
- ✚ Improve hospital efficiency through increased and better use of ICT, which then enables the investment of some of the savings into the stabilization of healthcare professionals' salaries.
- ✚ More efficient IT usage can increase healthcare providers' rating, contractual position with health insurance companies, and also may make it possible to increase employees' salaries.
- ✚ Integrating ICT into routine activities performed by nurses (mainly administration and patient management) can increase the amount of time they allocate for actual face-to-face patient care.

3. *Inefficient use of valuable healthcare resources*

- ✚ Healthcare needs and providing monitoring system at the level of electronic public health may help to identify hidden reserves and to detect losses.
- ✚ Prescription monitoring system makes it possible to identify when prescriptions are issued unnecessarily, as well as monitor the effectiveness of prescriptions.
- ✚ Share patients' electronic records can reduce duplicate examines.
- ✚ Efficient electronic procurement and resource allocation can decrease idle time of expensive examination equipment and healthcare professionals.
- ✚ Support of healthcare professionals through a National Health Portal (professional databases, encyclopedias, expert systems for prescriptions, and EBM) can minimize errors and mistakes, which in turn can decrease costs.

4. *Drug Policies (drug costs in Slovakia are higher than in other EU countries)*

- ✚ Prescription monitoring system can reduce prescription identification errors in which a patient gets the wrong medication.
- ✚ Manage drug interactions and contradictions so that all the medications a patient may be prescribed are consistent with the diagnoses and the patient's ability to tolerate a drug, thus reducing the risk of being harmed or injured by a prescription.
- ✚ A National Health Portal would provide objective information on alternate, less expensive generic drugs.

5. *Pan-European System for Healthcare Provisioning*

- ✚ Pan-European Healthcare Provisioning system so that healthcare providers in Slovakia would have access to and interoperability with the EU online healthcare system.
- ✚ Reduce the usage of healthcare systems abroad by increasing the quality of local healthcare provisioning and supported by eHealth services.

6. *Healthcare Provisioning Disparity*

- ✚ Disparity of healthcare provisioning quality in smaller hospitals as compared to larger hospitals can be caused by a difference in equipment or the quality of healthcare professionals. This disparity may be decreased through the use of tele-presence services (e.g. virtual consultation, second-opinion consultations, and the preparation and coordination for patient transfers), and the sharing of best practices through a National Health Portal.
- ✚ The disparity in healthcare provisioning due to the poor training of doctors in small hospitals, may be also be decreased by eLearning provided through a National Health Portal.
- ✚ Disparity in healthcare provisioning caused by poorly trained or poorer quality First Aid doctors, may be decreased through the use of tele-support access to better trained, higher quality, first-aid professionals.
- ✚ The lack of doctors with certain specialties, in some parts of Slovakia may be mitigated by increasing the efficiency of doctors and nurses. This may also help to ensure that patients are treated during working hours, i.e. not during extended hours.

7. *Hospital diseases*

- ✚ eHealth tools can help identify and track diseases contracted at hospitals themselves, which should help to decrease healthcare costs (such as expensive wide spectrum antibiotics).
- ✚ Expert tools for finding disease based on analyzing EHRs.

8. *Pandemic and biohazard preparation*

- ✚ Influenza viruses (HxNx) – These virus can include swine flu, but the main threat is avian influenza (with mortality rates of 60%), and in the case of an emergency outbreak, the particular influenza needs to be identified in a timely manner and the epidemiological needs to be accurately monitored using an on-line healthcare provisioning recorded (i.e. Electronic Health Record).
- ✚ A National Health Portal would provide citizens with updated and official information about an outbreak and what steps they should take, thus minimizing the risk of panic.

- ✚ A National Health Portal would provide healthcare professionals with detailed information on new high-risk pathogens and biohazards.

9. *Public Health System improvement*

- ✚ The Public Health system should have an electronic foundation for managing all of its functions. This would include current, reliable and official information about all citizens' health status, health risks, health needs, and consumption information correlated to a geographical area. All this information may be obtained from anonymous data in electronic health records and electronic medication and prescriptions.
- ✚ A National Health Portal would provide support for National Healthcare Prevention Programmes. This support includes education and role of community healthcare.
- ✚ Currently, public health information is at too low level for leading to its efficiency and benefits.

10. *New government healthcare policies*

- ✚ Government health policies must be updated based on current information about citizens' health status, trends. This information could be obtained via eHealth technology.
- ✚ eHealth would provide updated data for a defined set of health KPIs (Key Performance Indicators).
- ✚ eHealth would provide basic information health policy as well as for the support of national healthcare prevention programmes with clearly defined and measurable benefits.
- ✚ eHealth together with ePublic Health, in cooperation with other health-related IS, would provide information about health impacts of by the environment, allergens, chemical agents and hormonal contamination in the environment.

11. *Administrative load of healthcare professionals and citizens*

- ✚ Administration tasks can consume much of the time that doctors and nurses have available to devote to patient care. eHealth has an especially high value in decreasing the administrative work load – such as eliminating the need for reentering demographic data each time a patient visits the doctor, and sharing health documentation between healthcare facilities.
- ✚ eHealth would significantly decrease the amount of statistical reporting to the NHIC and the National Registries since data could be obtained from EHRs.

12. Genomics

- ✚ Genomics requires the use of ICT.
- ✚ When using genomics in therapy or for diagnostics and prevention, eHealth plays an important role in genomics data processing, storing and sharing.

13. Waiting Lists

- ✚ eHealth creates transparency and minimizes corruption when scheduling medical appointments and when managing waiting lists.
- ✚ eHealth can help coordinate between different waiting lists of multiple Health Care Providers in order to maximize the overall efficiency.

14. General Practitioners

- ✚ eHealth can reduce the amount of time that GPs spend on administration tasks, make it easier for them to share health documentation, and reduces the time for them to get medical test results without significant cost.
- ✚ It is important to have sufficient motivation for GPs use eHealth technology.

15. Ethics questions

- ✚ A National Health Portal could provide space for various discussions (e.g. ethics issues) between healthcare professional, between citizens, and between healthcare professional and citizens.
- ✚ A National Health Portal would provide information about views on ethics from abroad.

16. Corruption and misuse of the healthcare system

- ✚ eHealth may help to identify corruption and increase transparency which is key to decreasing corruption and misuse of the healthcare system.
- ✚ Data will be stored in electronic health records.
- ✚ Electronic healthcare provisioning that includes confirmation by patients. This can help prevent the fictitious reporting of medical services that were not actually rendered.
- ✚ Secure and reliable management of waiting lists.
- ✚ Electronic prescriptions that would provide guidance and advice for both patients and the prescribing doctors.
- ✚ Electronics surveillance tools that could be used to audit and conduct forensic analysis and investigations to help decrease corruption.

17. Cooperation with the community at-large

- ✚ In order for eHealth tele-services to work effectively and efficiently, there must be cooperation between the healthcare system and the community at-large.
- ✚ Next potential for cooperation is the electronic provision of complex, authorized and integrated data on social and health care to all stakeholders.

18. Economic Challenges

- ✚ eHealth may recover more than 50% of current yearly losses after its has been successfully implemented.
- ✚ eHealth may help to identify healthcare activities that are not profitable, cost-effective or efficient, as well as help to determine profit margins of healthcare providers in delivering medical services.
- ✚ eHealth decreases healthcare transaction costs.
- ✚ eHealth decreases financial losses due to duplications and mistakes that occur because of having insufficient information.
- ✚ eHealth more efficiently manages cost to patients by using a performance catalogue and guideline.
- ✚ eHealth provides basis for fair instigation of provided health care treatment through Health Care Surveillance Authority.
- ✚ eHealth can help prove that healthcare was provided in a safe, efficient and effective manner.
- ✚ eHealth reduce healthcare costs especially for chronic patients with the support of tele-services that can decrease the need for hospitalization provide care in-home.

19. Public Relations and Communication

- ✚ A National Health Portal with support from Facebook and other Internet social networks provides a PR platform for citizens, healthcare professionals and the media.
- ✚ The next generation of mobile phones with large displays, may also be an important platform.
- ✚ A National Health Portal itself can be used to educate and disseminate information.
- ✚ Virtual families (via Avatars) can be used to demonstrate eHealth benefits as well as problems within our current healthcare system.

20. Nanotechnologies

- ✚ Nano technologies are likely to create new data structures that have to be integrated into an her, and also requires collaboration with the use of tele-medicine.
- ✚ A National Health Portal can provide healthcare professionals and citizens with current information about the benefits of new nano services and how to access them.

21. Social-psychological effects of the modern age

- ✚ A National Health Portal in combination with Facebook and other social networks may provide users with direction within virtual worlds in order to minimize negative impacts on living in virtuality.
- ✚ The National Health Portal can help parents and relatives better understand the virtual worlds within which their children are “living”. The Portal can also provide guidelines on how to identify and manage the risks that their children face.
- ✚ Official and compelling information may reduce the negative health impacts of some psychologically-damaging fashion trends.
- ✚ The National Health Portal may be able reduce drug usage.
- ✚ Neurosciences could be easily integrated into an eHealth architecture. New data structures could also be integrated into a national EHR structure.
- ✚ The National Health Portal could provide information to synthetic drugs users about the risks of designer drugs The Portal, along with social networks, could help provide information about risks of overdose and the risks of long-term drug usage.

22. Paradigm Change in the relation between healthcare professionals and their patients

- ✚ A National Health Portal along with Facebook and other Internet social networks can be an important source of education and official information on diseases, diagnostics, therapies, traditional versus alternative medicine, and how to maintain a healthy life style.
- ✚ A National Health Portal can provide information about risks associated with the cure for a disease, drugs and its impacts, and healthcare quality monitoring.

23. Unforeseen impacts of modern medical success to society

- ✚ A National Health Portal can provide a platform for electronic discussion of benefits and ethical issues concerning the impacts of medicine on society, and the expectations for healthcare professionals.
- ✚ eHealth applications can increase the quality and efficiency of the healthcare provided to elderly people, thus enabling them to care at home, i.e. outside of the hospital (e.g. by using tele-services).
- ✚ A National Health Portal may help citizens understand that in order to maximize the benefits of medicine, there needs to be an active contribution from citizens, patients, their families and their relatives.

24. Health Impacts of living and working environments

- ✚ A National Health Portal can inform citizens about the effect of living and working environments, the risks, and the ways to minimize ill effects.
- ✚ A National Health Portal could provide detailed information about E additives, poisons, and allergens.
- ✚ A National Health Portal could provide information about risks in the work place and how to minimize the potential negative health impacts.
- ✚ A National Health Portal could provide information on how to decrease the impacts of stress, and how to maintain a healthy life style.

25. Impact of the economic and social factors

- ✚ Public health data and anonymous data from electronic health records, along with data from the Statistical Office, can provide a basis for assessing the health impacts of different social and economic groups.
- ✚ Advanced modeling helps to project the impacts to public health caused by economic conditions, income and social factors.

4. Potential eHealth benefits

This chapter describes potential eHealth benefits as described in Strategic eHealth targets.

Benefit to Citizens	<ul style="list-style-type: none"> ü Higher level of health care provided ü Communicate electronically with the healthcare system ü View available healthcare services and costs ü View healthcare information with 365/24/7 ü Increased administrative efficiency (less idle time of resources and fewer duplications) ü Increased quality of healthcare services due to a decrease in the number of diagnosis and therapy errors due to better healthcare methods and monitoring ü Access information about decisions made regarding your own health status, selection of healthcare provider, and drug preferences
Impacts on Healthcare	<ul style="list-style-type: none"> ü Decreased cost of administrative tasks ü Increased level of disease prevention ü Decreased costs through the reduction of healthcare duplications, fictitious reporting, and prescription errors ü Decreased in secondary costs through the decrease of mistakes made regarding diagnosis, prescription and healthcare delivery ü Decreased corruption in healthcare
Benefit to Health Care Providers	<ul style="list-style-type: none"> ü IS connection to registries and medical records. ü Decreased cost of administrative tasks ü Use of standard electronic identifier as well as standards to create and store health records, communication with other relevant subjects within healthcare ü Every IS (ambulance, economic, management, hospital, pharmaceutical, and specialist) will be fully interoperable and able to communicate in a standard formats at the same level as ambulances and hospitals do now ü Communication between healthcare providers will be in electronic and secured form. ü Electronic prescriptions will make the entire prescription process easier and more transparent.
Benefit to Health Insurance Companies	<ul style="list-style-type: none"> ü Decreased costs through the elimination of duplication, decrease in the number of mistakes, and shorter times for healthcare activities. ü Decreased administrative tasks costs ü Electronic patient and provider identifiers ü On-line monitoring of a provider's performance ü Secured communication with providers ü Efficient communication with healthcare providers
Increased healthcare surveillance	<ul style="list-style-type: none"> ü Pro-active monitoring. ü Healthcare Surveillance Authority (HAS) will get enough basis for fast and relevant decisions from audit reports.

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Summary of challenges

1. Growing gap between healthcare costs combined with needs of citizens verses the financial resources available for healthcare delivery to citizens:
2. Reduced capacity of doctors, nurses and other skilled healthcare professional
3. Inefficient use of costly healthcare resources
4. Drug Policy causes drug costs to be higher than in other EU countries
5. eHealth Proposed Implementation
6. EU visions for Healthcare Provisioning
7. Healthcare Provisioning Disparity
8. Hospital diseases
9. Pandemics and biohazards
10. Public Health and the need for improvement
11. New Health policy
12. Administrative load for health professionals and citizens
13. Genomics
14. Waiting Lists
15. General Practitioners
16. Ethic questions
17. Corruption
18. Cooperation between Healthcare and Social Care
19. Economic Challenges
20. Publicity and information
21. Nanotechnologies
22. Social-psychological effects of modern age
23. Change of relationship paradigm between healthcare professional and patient
24. Unforeseen impacts of modern medical success to society
25. Health Impacts of living and working environments
26. Impact of the economic and social factors