The Role and Importance of Digital Health under the Spotlight during COVID-19 Pandemic: Barriers, Challenges and Enablers for Broader Adoption

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Abstract:- The role and importance of digital health has been rapidly increasing in many countries of the world, in the last decade. Furthermore, its uptake dramatically accelerated during Covid-19 pandemic and is under the spotlight. In particular, telemedicine has become an only alternative for the management and prevention of non-communicable diseases and their complications, during lockdowns and social distancing. For the effective utilization of telemedicine services electronic medical records carry great importance. Electronic medical records have significant potential to improve quality of patient care and patient safety, facilitate workflow and provide benefits to specialists and healthcare organizations. While benefits and importance of telemedicine and electronic medical records has been widely recognized, adoption is still lagging behind in many countries, especially in developing countries.

The purpose of the presented research was to identify barriers and challenges for digital health adoption in healthcare sector, as well as, on the system level. To best achieve the research objectives, qualitative research method was applied. At the first stage, a detailed Literature review was conducted and was focused on barriers and challenges, as well as, enablers for broader adoption of telemedicine and EMRs. A total of 150 articles were identified and among them, 80 were determined to be relevant. At the second stage of the research unstructured, in-depth interviews were conducted with the stakeholders. In total, 29 interviews were conducted, recorded, transcribed and analyzed using N-Vivo software.

Analysis of the results revealed that major barriers for telemedicine and electronic medical record adoption on the system level are- lack of clear vision and strategy with regard to digital health, lack of reimbursement of telemedicine practices, inadequate legislative framework, lack of coordination and consistency, lack of stakeholder engagement and cooperation. Moreover, on the provider level major barriers are – resistance to change, low awareness, lack of trust in healthcare professionals and technological illiteracy. Cultural barriers and skepticism among doctors and specialists contribute to the hindered adoption of digital health, as well.

On the basis of results of the research recommendations were elaborated for decision makers. Consideration of these recommendations will facilitate irreversible process of digital transformation and technological disruption of healthcare in the Georgia.

Keywords:- Digital Health, Telemedicine, Electronic Medical Records, Electronic Health Records.

I. INTRODUCTION

Digital health has been seen as an evolving, strategic health priority for years. Even preceding the COVID-19 pandemic, the utilization of digital health technologies to make health systems and services more efficient and effective was widely recognized. However, COVID-19 pandemic drastically accelerated utilization of digital health technologies in many countries worldwide. Furthermore, digital health has gained importance not only for increasing affordability and accessibility to medical services but as a public health measure, for its role in non-communicable disease management in times of social distancing and lockdowns. According to World Health Organization (WHO), management of non-communicable diseases, has worsened significantly during Covid-19 Pandemics. To illustrate, monitoring and treatment of diabetes and its complications decreased by 49% worldwide, hypertensive disease management by 53%, oncologic diseases treatment by 42%, urgent care due to cardio-vascular system problems by 31%. Moreover, lower-middle-income countries were somewhat more likely to report troubles in the provision of these services. This is when the role of digital health technologies became accentuated as an alternative solution for increasing access to medical services. For instance, in the WHO survey, mentioned earlier, 58% of the countries demonstrated utilization of telemedicine to replace face-to-face consultations in times of pandemics. Moreover, 40% of low-income countries and 50% of lower-middle-income countries participating in the survey had adopted teleconsultation as an alternative channel for the management of non-communicable diseases (1).

Digital health is a broad category and encompasses electronic health records (EHR), telehealth, robotics, mobile health apps for monitoring and prevention, clinical decision-making support tools in primary healthcare, nanotechnologies, artificial intelligence, public health portals and integrated care delivery. The presented research

focuses specifically on telehealth and electronic health records (EHR)/electronic medical records (EMR).

Telemedicine was born in 1960s in Boston. Main idea of telemedicine is to bring health services directly to people's homes and to underserved communities, to make health care more responsive and effective. The most common areas for teleconsultations have been cardiology, dermatology, endocrinology, gastroenterology, hematology, infectious diseases, nephrology, and neurology. In addition to improved health outcomes for patients various studies have demonstrated significant cost savings for the system. For instance, experts have estimated that widespread utilization of virtual consultations and remote patient technologies for chronic disease management (which accounts for over 85% of direct healthcare spending in the country) could save United States $305 billion annually. Utilization of telemedicine skyrocketed due to Covid-19 pandemic. To illustrate, Teladoc Health Inc. reported a 60% increase in the number of virtual consultations and reached two million in three months from January to March in 2020 compared to the fourth quarter of 2019 (2). According to McKinsey, compared to 2019, when only 11% of US consumers relied on telemedicine, now this number has increased to 46% (3). Experts of the field anticipate that demand for telemedicine will keep increasing when pandemics will be over. The need will be further evident given the shortage of medical professionals in many countries (for instance in Central and Eastern European countries), increasing number of aging population globally and mix of aging population and aging healthcare professionals. Nonetheless, evidence from various studies demonstrates that there are number of challenges and barriers hindering broader adoption of telemedicine in different countries.

According to the results of the study conducted in the United States, teleconsultations and EHR can enable screening or treating a patient without the need for in-person visits and increase effectiveness of decision making process among multidisciplinary team in an outpatient, as well as, urgent care (4). Health system with an electronic health record is a critical precondition to realize the vision of a virtual health care model. EHRs classically contain patient's medical history, diagnoses and treatment, information about medications, allergies, immunizations, as well as radiology images and laboratory results. These are real-time, patient-centered records that provide instant and reliable information to authorized users. While EHRs collect information about the broader spectrum of health from all specialists and clinics involved in patient's care and can be shared electronically with other clinicians, EMRs are internal electronic versions of the traditional paper charts that gather, store and display patient information in the clinic (5). EMRs have significant potential to improve quality of patient care and patient safety, facilitate workflow and thus provide benefits to clinicians and healthcare organizations. According to WHO "a well-functioning EHR system improves the quality, accuracy and timeliness of patient information at point of care. EHR systems can play a pivotal role in UHC by providing insight into health care

costs, utilization and outcomes, promoting quality of care, reducing costs, supporting patient mobility, increasing reliability of information and providing access to patient information to multiple health care providers". Nevertheless, despite of all these benefits, widespread adoption of EMRs is still low in many countries.

An interesting showcase of effective utilization of telemedicine for Covid-19 patients' treatment, that captured attention of WHO and many experts from different countries, is Project Atlas implemented in the country of Georgia. It should be noted that Georgia is a developing country with unique healthcare system, where over 90% of the clinics are private-for-profit. Moreover, hospital sector of the country is highly fragmented and healthcare professionals are asymmetrically distributed among the various regions of the country (over 50% of medical professionals are concentrated in Tbilisi, the capital of Georgia). Furthermore, weak primary healthcare system creates additional challenges (6). According to experts' opinions, Covid-19 pandemic magnified existing weaknesses and gaps in the health systems of the countries, while more severely affecting developing countries. This was the case of Georgia as well, where the problems in the healthcare system created significant bottle-necks in provision of care for Covid-infected patients. Family doctors were unable to contact all the patients and to monitor their health condition. In this crisis, in one of the regions of Georgia (Kakheti region) virtual clinic was created that could accommodate as many patients as necessary without absorbing hours of doctors' time. "The framework linked up senior doctors, voluntary medical specialists, junior doctors, medical students and patients in a series of virtual, cloud-based chat rooms on Viber platform". Before, family doctors had to make phone calls, write notes and repeat the same general messages to each patient individually, after implementing this project individual patients could contact a doctor via their smartphone for tailored medical feedback and basic, protocol-based advice could be uploaded by medical students operating the system. Consequently, the doctor's time was freed up to respond to the most urgent requests. Even though the results of this pilot project were appraised positively by the government, stakeholders and experts of the field and was broadly discussed in medical society, attempts of expansion of this scheme in other regions of the country were unsuccessful (7).

On the one hand, need and benefits of digital healthcare, in particular, telemedicine and EMRs is obvious, on the other hand its broader adoption and expansion is significantly lagging behind. Consequently, the purpose of this research was to identify barriers and challenges for digital health adoption in healthcare sector, as well as, on the system level. The main research question was formulated as – **"Which factors hinder implementation and adoption of telemedicine and EMRs in Georgia?"** Consequently, the goals of the research were: to conduct situational analysis, to identify major problems and challenges related to telemedicine and EHR&EMR implementation; to evaluate common barriers, challenges and enablers for digital health technology adoption globally, with particular focus on

developing countries. Situational analysis and interviews were conducted with a focus on Georgia.

II. METHODOLOGY

To best achieve the research objectives, qualitative research method was applied. It started with a detailed Literature Review and was focused on barriers and challenges, as well as, enablers for broader adoption of telemedicine and EMRs. A total of 150 articles were identified and among them, 80 were determined to be relevant for inclusion. For this reason, HINARI, IOM, NCBI, PubMed, Google Scholar, and Elsevier scientific article bases were used. During the literature review, various studies, meta-analyses, and systematic reviews were evaluated on the topic of telemedicine and EMRs.

In keeping with the research goals, during the second stage, qualitative study - in-depth interviews with various stakeholders were conducted. The target group of respondents for interviews consisted of representatives of the Ministry of Healthcare in Georgia, National Center for Disease Control and Public Health, teleclinics, insurance companies, management of project Atlas (virtual clinic for Covid-19 patients), medical software development companies, donor organizations assisting Georgia's government in the implementation of digital health projects, experts, doctors, patients, start up companies working on telemedicine and EMRs. A total of 29 in-depth interviews were conducted. Due to Covid-19 pandemic, only three interviews were face-to-face and 26 interviews by video calls. The average duration of an interview was 50 minutes. Upon the collection of adequate data, interviews with the specific stakeholder group were ceased. Based upon informed consent; the interviews were recorded, then transcribed and analyzed using N-Vivo software.

III. RESULTS

During the literature review, various studies and systematic reviews were evaluated on the topic of telemedicine and EMRs. In particular, barriers hindering adoption of telemedicine and EMRs, as well as, challenges were assessed. Moreover, needs and enablers for successful implementation were evaluated. It should be noted that, in the scientific literature there is a lack of wide-sample studies and the vast majority of studies are conducted on pilot projects. Therefore, systematic reviews were targeted primarily.

According to the results of one of the reviewed studies – American Telemedicine Association's 2017 Leadership Survey- 71% of the leaders in the field perceive inadequate coverage and payments to be leading barrier to increased adoption of telemedicine; licensure was named by 53% of the surveyed, resistance to change by 50%. Whereas, only 19% of surveyed leaders indicated bandwidth and 15% privacy/cybersecurity to hinder accelerated growth of the industry. Reimbursement of telemedicine services (by insurance companies or state healthcare system) is cited to be one of the most important barriers in the literature (8,

9,10). In the WHO European Region, leading barriers to implementing and sustaining telehealth services are: a lack of funding to develop and support telemedicine - in 30 member states (71%) and lack of legal regulations or legislation in 18 countries (42%) (11). In general, major and most prevalent barriers to telemedicine adoption globally are: a lack of funding, a lack of infrastructure, lack of legislation or regulations governing telemedicine services, competing priorities in healthcare systems and lack of telemedicine champions. Concerning barriers to patient acceptance and continued use discussed in the literature, these are lack of training, poorly designed interfaces, lack of collaboration between implementers and customers/users, lack of consideration of specific patient needs, low patient motivation, lack of confidence, lack of technological literacy (especially in older age groups), lack of support from medical staff, and patient preferences for in person care (12, 13).

Furthermore, as it shows business models behind each country's healthcare system influences degree of adoption of telemedicine practice. To illustrate, in the Netherlands, positioning telemedicine as a way to decrease number of hospitalized patients means "killing the business". The more patients, greater the revenue. The same is true for Georgia, as well as, for the other countries where revenue is generated by having patients in the hospitals. Consequently, reimbursement model is one of the key barriers for telemedicine versus traditional medicine.

Furthermore, there are cultural barriers that hinder implementation or broader adoption of telemedicine, such as, lack of acceptance of telemedicine practices by doctors and medical professionals. To illustrate, a survey of several hundred adults in Austria conducted in 2015, revealed the "lack of acceptance by doctors" as the second top ranked overall barrier for the adoption of telemedicine. Moreover, doctors' attitudes significantly influence patient acceptance of virtual care (14).

Concerning EMR and EHR implementation, literature review shows that major barriers are – relatively high cost and insufficient return on investment for small clinics and practices, lack of funding, underestimation of change management approaches and organizational competences, lack of skilled resources for implementation and support, failure to redesign business processes and workflow in clinics to incorporate digital technologies, lack of trust and concern regarding negative unintended consequences of technologies (15, 16).

The hindering or enabling factors mentioned above are mainly extracted from the literature concerning developed countries. Accordingly, the second stage of the research (in-depth interviews) was focused on Georgia as a case study which gives a snapshot of a developing country. According to the opinions of respondents, major barriers hindering telemedicine adoption in the country, on the system level are: lack of supportive legislation and regulations, lack of reimbursement by private insurance companies and state universal healthcare program, and lack of trust. In particular,

current regulation in Georgia, allows only doctor-to-doctor telemedicine practice and direct to consumer teleconsultations are not in line with legislation. Moreover, inexistence of clear definition of telemedicine and services that can be provided through virtual care influences significantly, in a negative way, reimbursement by insurance companies. Despite this fact, there are several teleclinics and clinics offering online consultations to consumers, in Georgia. However, during interviews, representatives of these clinics described serious difficulties they face due to inadequate regulations and claim that this is one of the key barriers for the slow adoption of telemedicine in the country.

In the literature, it is emphasized that countries, where telemedicine use is most advanced are countries where policy makers are facilitators, enabling the spread of best practices through knowledge transfer and dissemination. Furthermore, based on an evidence, one important way in which governments can enable the spread of good practices is through knowledge aggregation, sharing and dissemination. Georgia's healthcare system is highly fragmented, with many small, private clinics poorly communicating with each other and difficulties in cooperation between the government and provider sector. To illustrate, in 2020, announcement was made by Georgia's ministry of healthcare regarding planned reforms in primary healthcare and implementation of telemedicine services as a cornerstone of these reforms. During interviews these plans were mentioned with all respondents (including representatives of ministry of healthcare and other officials). The vast majority of stakeholders interviewed in the scope of the research, didn't possess any specific information neither about the strategy, nor about action plan. Even more, in an absence of particular strategy regarding E-Health and without clear vision, ministry of healthcare started purchasing equipment needed for telemedicine services in village outpatient clinics. Some of the stakeholders got information about this project in the process of interviews and expressed concerns, since no dialogue with stakeholders, nor sharing of knowledge and experience or needs assessment was conducted. To recall lessons learned from the literature, experts recommend to start preparatory works with stakeholders and assessment of the context 2-3 years prior implementation of telemedicine projects. Another significant advice from experts is to evaluate very carefully context, as what works, or does not work, for one country or organization might not have similar results in other situations. When trying to transfer learning between countries or organizations contexts and ecologies should be compared carefully (17).

Another problem on the system level is a lack of coordination, monitoring and follow up of implemented digital projects in healthcare. For instance, electronic registries were implemented with aid of donors' international assistance in Georgia. However, the data from these registries are not utilized effectively for decision-making or for identification of problematic areas etc. Accordingly, respondents expressed concerns about follow up and sustainability of telemedicine project as well. It should be noted, that among the respondents were founders

of the first telemedicine company in Georgia. Telemedicine service scheme was set up in 2012, in the regions and rural areas managed from the head office in the capital city. According to their experience major problems that caused failure of the initiative were lack of reimbursement, fragmented care and lack of support from government's side.

Barriers on the provider level include lack of trust towards telemedicine practice among doctors and patients. According to the literature review, "low awareness toward modern technologies and their use in delivering health care seems to be a big barrier in developing countries". This opinion was strengthened on the basis of interview results. Moreover, people in developing countries are not much aware about the benefits offered by telemedicine. Even physicians are short of IT knowledge and not updated. Poor awareness level creates doubts and resistance toward digital technologies and create problem in the adoption and development of telemedicine. As results of interviews showed, awareness is indeed quite low in patients, as well as medical professionals. Especially, older-age doctors experience more difficulties and skepticism.

Another barrier on the provider level is interoperability issue. Existing teleclinics use their own software, where information about patients is stored in electronic medical records, patients can have access to this information but it is not integrated with patients' medical information from other facilities.

Another subject of inquiry during interviews was to identify barriers and challenges hindering adoption of EMRs in medical facilities and successful implementation of EHR in the country. First of all, it should be noted that ministry of healthcare of Georgia since 1st of January 2021 mandated all clinics to enter data in EHR. Nevertheless, according to the opinions of respondents, clinics (especially small-size ones) face number of challenges to comply with new regulation and the process itself is not appraised as effective. The reasons behind this are lack of EMR implementation in provider sector, interoperability issues and cultural barriers on the side of healthcare professionals. A lack of EMR implementation in clinics itself has underlying causes, such as – cost of software, low awareness about its benefits among management of medical facilities and resistance from the doctors and specialists. According to respondents, the fact that ministry of healthcare mandates hospitals to keep hard copies of medical records counterweights cost-effectiveness as a benefit offered by EMRs. Moreover, planning problems were revealed in this regard, as well. To illustrate, ministry of healthcare had constrained resources to conduct adequate number of workshops and trainings for representatives of provider sector. Furthermore, information about the purpose of EHR wasn't disseminated and delivered to healthcare specialists adequately. Accordingly, doctors and specialists perceive it "as an additional duty not making sense, just for the purpose of controlling doctors". In this regard, it should be mentioned, that in the interviews, managers of clinics where EMR has been successfully implemented, named change management principles-

including preparatory works and "champions" supporting change in the company – as major enabler.

Another barrier for EHR effectiveness is interoperability among various EMR programs implemented in clinics and EHR, hindering exchange of information between clinics and EHR portal and from various portals (such as vaccination portal, birth registries etc.) with EHR.

Still another barrier for EMR implementation cited by respondents, is a lack of motivation and awareness among managers of medical facilities. More specifically, majority of managers of clinics do not perceive benefits of EMR and its role in risk management, patient safety and quality improvement. Frequently, in the process of EMR implementation clinical processes and workflow should be changed and resistance from managers and doctors hinder the process. To illustrate, when specialist has only 15-minute interval for the consultation, to enter information in EMR is perceived as an additional burden and lost time (thus revenue).

As it was mentioned above, more than 90% of clinics in Georgia are private-for-profit facilities. Consequently, the more care is provided the more the revenue. "Overmedicalization" and "overinvestigation" are significant challenges of healthcare system in the country. The question that respondents posed during interviews and that should be answered is – why should these facilities want more transparency and control through EMR or EHR program? In this case, the government- who's interest is to make healthcare system more efficient and effective- should be in a leadership position and in flagman role, to pursue changes in this direction.

IV. DISCUSSION

Analysis of the results of the conducted research reveal challenges and barriers hindering implementation and broader adoption of telemedicine and EMR in Georgia- a case of a developing country, on the system level, as well as, provider level. Major barriers on the system level are: inexistence of strategy and clear vision with regard to E-Health development in the country. Moreover, current regulation and legislation is hindering expansion of telemedicine practice and not supporting/incentivizing implementation of EMR. Another significant barrier is a lack of payment for telemedicine services and absence of standards for this practice, that hinders reimbursement from the side of insurance companies as well. Still another identified barrier was inadequate cooperation and communication from governmental bodies with stakeholders. Accordingly, stakeholders lack information about future plans of government with regard to digital health, are not involved sufficiently in ongoing projects and find it difficult to anticipate future of their businesses. Furthermore, specificity of contexts has crucial impact on the success of telemedicine or EMR implementation. In case of Georgia, past lessons, failed initiatives of telemedicine projects, nor analysis of Atlas project results (Covid-19 patient management by telemedicine mentioned above) or

stakeholder satisfaction (which is named in the literature as a critical factor for success in this direction) are studied to evaluate context carefully. Moreover, provider sector is highly fragmented and exchange of knowledge or experience among stakeholders is absent.

On the provider level, the major barriers and challenges revealed were: lack of awareness and management qualification among managers, resistance to change, skepticism and lack of trust from healthcare professionals and lack of infrastructure.

On the basis of the research, the following recommendations were elaborated. To adopt successfully E-Health, in particular telemedicine and EMR in Georgia and support its sustainability, government needs to be in a leadership position. Furthermore, various responsible governmental units should integrate efforts to achieve common goals and work in a coordinated manner. Moreover, governmental team should establish close cooperation with stakeholders, engage them actively in the reforms concerning digital health, evaluate context carefully and assess effectiveness of existing pilot projects. Consequently, clear vision, strategy and action plan should be developed. More specifically, policy level questions should be answered, which telemedicine services can be effective in a country context, what are the needs, what kind of scheme should work etc. Furthermore, importance of incentivizing start ups working on digital health is accentuated in the literature. The government should offer incentives, good soil for development to attract and stimulate start ups working on digital health solutions to facilitate E-Health adoption in the country.

Another recommendation concerns regulation and legislative framework, which should be changed in order to enable and facilitate telemedicine and EMR adoption in the country and to develop relevant policy and standards. While mentioning cooperation with stakeholders, it is considered that insurance companies should be included in this process and reimbursement of telemedicine services facilitated.

To overcome barriers and challenges identified on the provider level, with consideration of the context of developing country, government should take responsibility to increase awareness and knowledge about digital health among healthcare professionals and managers. The process of telemedicine or EMR implementation should be envisioned as a change management process and relevant principles followed.

V. CONCLUSION

In conclusion, telemedicine and EMR offer significant benefits for Georgia's healthcare system such as improved geographical and financial accessibility to medical services, higher quality of medical care and patient safety. Especially, in the times of pandemics these technologies gained great significance as an only alternative for monitoring and management of non-

communicable diseases, as well as Covid-19 cases. Nevertheless, there are number of barriers and challenges on the system and provider levels that should be worked out to adopt effectively telemedicine and EMR and to support its sustainability. There are several pilot projects ongoing in the country, as well as exists previous experience of failed initiatives. With analysis of these cases and close cooperation/collaboration with stakeholders, clear vision and strategy should be established. What works in case of one country or organization may not work in case of another. Therefore, country context should be evaluated carefully and solutions should be tailored accordingly. Resistance from healthcare professionals is significant barrier for the implementation of digital health initiatives. To overcome this, effective and sufficient communication is needed, adequate information should be provided and change management tactics applied. This in turn would facilitate irreversible process of digital transformation and technological disruption of healthcare in the country.

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